

**CURRICULUM POLICY IMPLEMENTATION IN THE SOUTH AFRICAN
CONTEXT, WITH REFERENCE TO ENVIRONMENTAL EDUCATION WITHIN
THE NATURAL SCIENCES**

by

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DECLARATION

I, HLANGANANI MAGGIE MALULEKE, hereby declare that this thesis – which is submitted to the University of South Africa for the Doctoral Degree in Education – has not been submitted by me for any other degree at this or any other university. I further declare that this is my own work, and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Signature

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Date

DEDICATION

First of all, I sincerely dedicate this thesis to my late parents, Dad Samuel and Mom Sasavona N’wa-Shimange Maluleke, who laid my foundation in my early years and invested in my studies. Secondly, I dedicate this thesis to the memory of my late brother, Stanley Maluleke, and my late sister-in-law, Rose Maluleke, for their encouragement, kindness, and support. They may be late, but will never be forgotten!

Thirdly, I dedicate this thesis to the following:

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ABSTRACT

A growing body of research has emphasised the social processes by which teachers – who are curriculum policy implementing agents – are trained and supported on how to practically implement policies in the classroom. Yet, little attention has been paid to the factors that influence teachers’ interpretation of curriculum policy and how their understanding of policy implementation influences the ways in which they respond to policies. Some research has already been done on the implementation of curriculum policies in schools, with findings centred largely on the disjuncture between policy and practice. Research has also established that much of what teachers are doing in the classroom does not reflect policy. Although teachers have opportunities to enhance the implementation of policy, there are also factors that negatively influence their implementation of educational policy. This is basically because of the gap between the policy makers and the implementing agents. The lack of a shared understanding between these two stakeholders’ results in a perception of policy as a set of strict rules and procedures meant to be followed by teachers.

This study aims to develop an understanding of what influences teachers in their attempts to implement the curriculum policy on environmental education in the classroom. The study further aims to gain an understanding, from the practitioners’ perspectives, of how policy implementation challenges their habitual patterns of teaching and schooling and whether, to them, this implementation seems to threaten the conventional disciplinary curricular structures of fixed timetables and depending on textbooks, and leaves little room for outdoor or hands-on activities. The focus on teachers is motivated by the fact that they are the primary curriculum implementers in schools and as such, are expected to play a significant role in implementing the curriculum according to policy.

This study advocates an interdisciplinary approach to implementing environmental education policy in teaching and learning in the Natural Sciences. This entails environmental education becoming part of the curriculum, and being taught as a cross-curricula component. In this context, environmental education will form part of teaching and learning in every learning area of the curriculum for the General Education and Training band of the South African education system. What this means for teachers is that

they have to integrate environmental concepts or topics within their respective learning areas, and that they have to follow a learner-centred approach that allows learners the opportunity to become active participants, responsible for their own learning. This implies that, for learners to develop knowledge, skills, and correct attitudes regarding the environment, teachers have to use available, local teaching materials or resources. As the classroom becomes free from traditional teaching styles, learners become active and take responsibility for their own learning. They discuss and share ideas with one another, and the teacher becomes the facilitator of the teaching and learning process.

Keywords: *Curriculum, policy implementation, environmental education, teacher sense-making, education system.*

LIST OF ACRONYMS AND ABBREVIATIONS

APP:	Annual Performance Plan
CAPS:	Curriculum Assessment Policy Statement
DET:	Department of Education and Training
DEAT:	Department of Environmental Affairs & Tourism
DoE:	Department of Education
FY:	Financial Year
GET:	General Education & Training
IUCN:	International Union for Conservation of Nature
NEEP-GET:	National Environmental Education Project – General Education & Training
NGO:	Non-Governmental Organization
SASA:	South African School Act
UN:	United Nations
UNCED:	United Nations Congress on Education
UNESCO:	United Nations Educational, Scientific and Cultural Organisation
WEEC:	World Environmental Education Congress

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CHAPTER 1 : BACKGROUND OF THE STUDY

1.1 INTRODUCTION AND RATIONALE FOR THE STUDY

This study argues for an interdisciplinary approach to the implementation of environmental education policy to teaching and learning within the Natural Sciences learning area. The implementation of environmental education as an interdisciplinary approach to teaching and learning entails that environmental education becomes part of the curriculum, and is taught as a cross-curricula component (DoE 1995:20; DoE 2002:8-10; DoE 2009:147). In this context, environmental education forms part of teaching and learning in every area of the curriculum for the General Education and Training band of the South African education system. The implication for teachers is that they have to incorporate environmental issues in their respective learning areas. Because the current South African education system is based on outcomes, teachers have to follow a learner-centred approach that provides learners with the opportunity to play an active part and take responsibility for their own learning. For learners to develop knowledge, skills, and correct attitudes towards the environment and teaching as a whole, teachers have to use available local teaching materials or resources. Teachers also need to be creative and be able to apply teaching strategies that involve learners and help the latter to develop knowledge, skills, and positive attitudes towards the environment. As the classroom becomes free from traditional teaching, learners become active and take responsibility for their own learning. They discuss and share ideas with one another, and the teacher becomes the facilitator of the teaching and learning process. Thus, teachers no longer transmit knowledge to learners who are then expected to regurgitate what they have learnt; instead, the emphasis is on the learning outcomes (DoE 2002:8-9).

This study is located within the field or area of educational policy implementation. Its overall aim is to develop an understanding of how Natural Science teachers implement the curriculum policy of environmental education in the Natural Science learning area. This study is limited to Grade 9 teachers in the General Education and Training band of the South African education system.

Some research has already been conducted on the implementation of environmental education in schools. These findings emphasised the disjuncture between policy and practice (Cohen & Heather 2000: 294-343). Furthermore, some of this research established that much

of what teachers are doing in the classroom does not reflect the content of the policy (Cohen & Heather 2000: 294-343). This is due to the gap between policymakers and implementing agents. The lack of a shared understanding between the two stakeholders results in viewing the policy as a set of strict rules and procedures that they must follow. Thus this study aims to develop an understanding of what influences teachers in their attempts to implement the policy on environmental education in the classroom.

The value of this study lies in the fact that it endeavours to provide practitioners' perspectives on policy implementation and how this challenges their habitual patterns of teaching and schooling. The rationale for probing teachers' perspectives is that implementing the policy threatens the conventional disciplinary curricular structures of fixed timetables and depending on textbooks, and leaves little room for hands-on outdoor activities. The focus on teachers is justified by the fact that they are the primary curriculum implementers in schools. Consequently, they are expected to play a significant role in implementing the curriculum as per the policy. In light of this, teachers are also expected to play a determining role in the promotion of environmental education as an interdisciplinary approach to teaching and learning in the classroom.

According to Khosa and Motala (1999), numerous studies have been conducted on policy implementation from different perspectives. Examples of studies in this area include those done by McLaughlin (1987), Spillane (1998), Jansen (1999), Sayed and Jansen (2001), Whitty (2002), Smit (2003), and Morris and Scott (2003). Most of these studies have reported on how teachers respond to policies in general. What influences teachers' responses to policies that involve change in their usual teaching patterns have not been sufficiently explored. The unique contribution of this study resides in that it aims not only to explore how teachers respond to policy implementation in general, but rather to establish how Natural Science teachers interpret and respond to the transformative policy regarding the implementation of environmental education in the South African context. Another characteristic that distinguishes this study from others on the same topic is that it is located at the intersection of two subject areas – science education and environmental education. Indeed, most studies on policy implementation are based on single subject areas (Jaworski 1994; Tate 1995; Moseley & Reinke 2002; and Goussia-Rizou & Abeliotis 2004). The uniqueness of this study also resides in that it takes into consideration the transformative nature of South African policy provisions on environmental education which seeks to infuse

environmental education into all learning areas in order to achieve a constitutionally guaranteed right to a healthy environment.

Based on the above, the significance of this study is that it enabled the researcher to explore how teachers make sense of and respond to policy in general, and what really encourages or discourages them when responding to the policy regarding the implementation of environmental education. In other words, this study is important because it provides insight on how Natural Science teachers understand and negotiate the task of becoming experts in the two learning areas they are supposed to infuse, namely Natural Science and environmental education.

1.2 THE PURPOSE OF THE STUDY

The purpose of this study is to explore how and why Grade 9 Natural Science teachers in South Africa interpret and react to the policy regarding the teaching of environmental education in the classroom. It must be emphasised that environmental education is regarded as a tool towards a well-informed global response to global environmental challenges. In this regard, this study seeks to develop an understanding of what encourages or discourages teachers from responding to the policy on environmental education as intended. Such an understanding will enlighten reformers on the kinds of teacher support needed to implement the new curriculum policy on environmental teaching within the Natural Sciences and other learning areas.

1.3 FORMULATION OF THE PROBLEM

Several international events have provided orientation on environmental education. These include the IUCN (1971), the Stockholm Conference (1972), the Tbilisi Conference (1977), the UNCED International NGO Forum (1992), and the Thessaloniki Conference (1997). Over the past decades, environmental education activities in South Africa have been informed by these international developments and the ensuing guidelines (UNESCO 1983). However, environmental education processes in this country have also developed a particular orientation which has been shaped by practical experiences both locally and globally. More recently, such events as COP 17 (2011), the UN Summit (2002), and the WEEC (2007) have continued to strengthen the need for environmental learning in South Africa by once again

putting environmental crises at the centre of the global concern for policy development and action. The slow but far-reaching transformation processes following South Africa's first democratic elections involved many policy changes. The White Paper on Environmental Management Policy (1997) – which stresses the role of environmental education – identifies the Department of Environmental Affairs and Tourism (DEAT) as South Africa's leading agent for environmental management. In a ground-breaking participatory initiative started in 1993, an alliance between the Department of Environmental Affairs and Tourism (DEAT) and civil society rallied support for the consideration of environmental issues in the development of educational policy (White Paper on Environmental Management Policy 1997). In the same vein, in 2001 the Minister of Education announced the launch of a R34 million National Environmental Education Programme (NEEP) for the General Education and Training (GET) band. This programme was developed in partnership with the Danish government. The NEEP-GET aims at fostering inter-sectoral cooperation and ensuring that environmental concerns are addressed in every learning area of the national curriculum (NEEP-GET 2004:61).

In the national government, the Department of Environmental Affairs and Tourism – in partnership with various bodies, including the Environmental Education Association of South Africa – has played a key role in motivating the inclusion of environmental considerations in the curriculum. Subsequently, a new curriculum – grounded on Outcomes-Based Education and a learner-centred framework for teaching and learning – was introduced in 1996, with the aim of transforming the education system in South African schools. The policy and curriculum lobbying by both the Environmental Education Policy Initiative that took place between 1993 and 1995 and the Environmental Education Curriculum Initiative of 1996 bore considerable fruit in 2000. Indeed, the Council of Education Ministers advised curriculum developers to pay special attention to environmental education when refining the curriculum. Each one of the eight learning areas of the GET band of the curriculum had to address the aspects of environmental education outcomes that are integral to them (DEAT 2001:5).

These developments were aimed at giving general, formal recognition to environmental education in the South African school curriculum. However, the implementation process of the environmental education policy in the classroom remains a daunting and challenging task for teachers. Indeed, so far only individual teachers and schools seem to be involved in

environmental education activities; sometimes, with support from individual education department staff, or principals with an interest in environmental education (Lotz-Sistika 2002: 111).

Some teachers received teacher- and learner-support materials and training on environmental education from various agencies such as the Share-Net resource network, and some teachers organised school group visits to various environmental education centres. Nevertheless, Lotz-Sistika (2002: 111) stresses that most of these teacher-initiated activities were uncoordinated and, at times, poorly articulated in school programmes and curricula. The launch of the 2001 National Environmental Education Programme for the General Education and Training band was expected to address these problems. This programme is aimed at enhancing inter-governmental cooperation between the Departments of Education, Environmental Affairs and Tourism, Water Affairs and Forestry and others, so as to provide a coherent and coordinated framework through which various environmental bodies can work with schools. The NEEP-GET programme is also aimed at building the capacity of provincial education department staff so that they can effectively support teachers through facilitation of sessions on the environmental learning processes of the curriculum for the General Education and Training band.

These government initiatives on environmental education have been encouraged, supported, and paralleled by the committed activities of a range of non-governmental bodies. Despite the encouraging level of involvement of government, donors' support, and non-governmental activity, the implementation of the environmental education policy embedded in the curriculum for the General Education and Training band of the South African education system still poses challenges. Delport and Mangwaya (2008: 220-238) identified the following as the major challenges to the implementation of environmental education in schools: the diverse nature of the education system, the impact of school organisation on teacher training and practice in the classroom, and inadequate teacher training.

In addition to the above-mentioned issues, the theoretical content of the policy itself has an impact on teachers' implementation of the educational policy in the classroom (Smit 2003:175). Whitty (2002: 113) notes that, in the process of making sense of and responding to the policy, teachers often tend to ignore or modify the policy according to their interests and agendas. Hence, teachers often operate in their comfort zones, in that they usually do

what they are comfortable with, and modify what poses a challenge. This mismatch between policy and practice remains one of the main issues that needs to be addressed to ensure smooth implementation of the educational policy. Hope (2002:40-44) observes that school teachers often disregard what is reflected in policy.

1.4 RESEARCH QUESTIONS

To answer the broader research question on the implementation of environmental education within the Natural Science learning area of the General Education and Training band in schools, the following specific research questions will be explored:

Research Question 1: What policies stipulate the provision of environmental education in South African schools in the General Education and Training band?

Research Question 2: How do Natural Science teachers understand and respond to the policy regarding the implementation of environmental education in the classroom?

Research Question 3: What influences Natural Science teachers' understanding of curriculum policy implementation?

1.5 SIGNIFICANCE OF THE STUDY

Despite numerous publications, empirical and theoretical works that clarify the essence of environmental education, many South African teachers still experience challenges related to its actual implementation. The implications of the non-implementation of environmental education as per the curriculum policy, informs the ontological assumption that forms the basis of this study. This argues that most of the currently reported findings about the implications of the inclusion of environmental education in the curriculum constitute the very barriers to its effective implementation in the classroom. In other words, because barriers and constraints to environmental education are dominant, opportunities for its effective implementation are overlooked, and sometimes ignored. This is because the value of environmental education does not seem to be applicable to the implementers' situations, or is not in line with their interests and agenda; it is, as Spillane, Reiser and Reimer (2002: 387-496) call it, "inconsistent". In this regard, McLaughlin (1987:235) emphasises that

unless teachers interpret and act on the environmental education policy at each step of the process, there will be no change in practice. In the light of the above, this study assumes the existence of a gap between policy intentions and what teachers do in practice. Therefore, it becomes important to conduct a study that explores how teachers make sense of the curriculum policy, the relationship between the theoretical and practical aspects of this policy, and what causes teachers to respond to the policy the way they do. The study aims to significantly raise the awareness of policy makers and education reformers about the challenges facing teachers with regard to the implementation of educational policy. This will, hopefully, ensure a common understanding and dialogue between policy makers and teachers, and lead to the effective implementation of curriculum policy in future. Good communication between policy makers and implementers will help to address the disjuncture that exists between policy and practice. The findings of this research are expected to improve teachers' knowledge, beliefs, and values regarding the implementation of the policy on environmental education, and the education reformers' understanding of the kind of support that teachers need to be able to effectively implement the education policy.

1.6 LITERATURE REVIEW

Several studies have emphasised the constraints and impediments to the effective implementation of environmental education as a cross-curricula component in schools (Clacherty 1993:23-40). Powers (2004:371) identified time as one of the major factors hindering the effective integration of environmental education in the classroom. Indeed, in his research, conducted between December 2001 and February 2002 in the United States, he found that although many teachers have shown some interest in integrating environmental education into their respective learning areas, time remains the main challenge to implementing environmental education across the curriculum. For their part, Monroe and Cappaert (1994:63) identified overcrowded timetables and inadequate resources as the most common hindrances to teachers' integration of environmental education across the curriculum. Differently put, teachers find it difficult to integrate environmental education in the classroom because their overcrowded timetables leave them with very little time for environmental teaching. Pace (2003:28-35) conducted a similar study in which teachers identified time and inadequate teacher training as the major obstacles to the integration of environmental education principles in the classroom.

To date, some teachers have embraced the interdisciplinary approach to the incorporation of environmental education to the teaching and learning of the curriculum for the General Education and Training band (Clacherty, Sinclair & Lotz 1999:119). Clacherty et al. (1999:119) identified a number of schools that have incorporated environmental education programmes in their curriculum. Simmons (1998:15-18) contends that in other areas environmental education is not only taking place in the classroom situation, but excellent work is also being done outside the school premises to raise learners' or children's awareness of environmental issues and to encourage them to care for their environment. Simmons (1998:15-18) also mentions that many schools now have their own gardens, recycling schemes, and energy audits.

The South African national Department of Education has launched a number of initiatives geared towards the implementation of environmental education within the formal curriculum. Commitments to effectively integrate environmental education into the entire curriculum at all levels of education and training, have been made. Thus, to date, environmental education as an interdisciplinary approach to teaching and learning across the curriculum for the General Education and Training band has been introduced in many schools.

However, in spite of initiatives taken to encourage and facilitate the integration of environmental education across curricula, much of the responsibility to make sense of and respond to the policies that make provision for environmental education in schools is left to teachers. Hence, the rationale for this study is the need to gain a teacher-centred perspective on the factors that encourage teachers to, or discourage them from, making sense of and responding to such policy. In particular, the study examined how Natural Science teachers perceive, create, and use the available opportunities for successful implementation of the environmental education policy in the classroom.

1.7 RESEARCH METHODOLOGY

This section describes the methodology or research process followed in gathering information from the practitioners. According to Bogdan and Taylor (1975:75), in a broad sense, the term methodology refers to the process, principles, and procedures by which we approach problems and seek answers. It must be noted that the research design of this study

is presented in fairly broad terms. This study is located within the interpretive paradigm which then guides the choice of methods. Thus, the appropriateness of qualitative research methods, for instance, depends on an understanding and valuing of the assumptions underlying the paradigm within which a study is located (Cohen, Manion & Morrison 2000:44).

1.8 RESEARCH DESIGN

According to McMillan and Schumacher (1997:106), a research design refers to the plan and structure of the investigation used to obtain evidence to answer research questions. The purpose of the research design is to provide the most valid and accurate answers possible to research questions. It is a very important part of an investigation, since certain limitations in interpreting the results are related to the chosen design, which also determines how data should be analysed (McMillan & Schumacher 1997:109).

This study is based on a qualitative research design. This is because the researcher's intention was to collect descriptive data in the form of teachers' spoken or written words. This focus on people's views is one of the major characteristics that distinguish a qualitative research paradigm from a quantitative one (McMillan & Schumacher 1997:107). Within a qualitative paradigm, data collection techniques are used to capture the richness and complexity of the behaviour displayed in a natural setting, from the participants' perspective. Once collected, data can then be analysed inductively to generate findings. This enables the researcher to gain detailed information about the individual or place and to be highly involved in the actual experiences of the participants (Creswell 2003:20).

According to Creswell (2003:20), qualitative research uses multiple methods that are interactive and humanistic. In other words, the variety methods of data collection not only provide opportunities for the active involvement of the participants, but also emphasise sensitivity to the research participants. This information is useful to the researcher because the chosen data collection approach involves participants with whom the researcher seeks to build a relationship based on a common understanding, and which is aimed at ensuring the credibility of the study. The selection of a qualitative research approach is further based on the fact that it is emergent rather than tightly prefigured. This enables the researcher to change or refine some of the questions in terms of how to ask them and to whom. The

researcher is also able to change the data collection process, as opportunities arise or disappear. The qualitative research approach also allows researchers to get information about the best sites from which they can learn more about the phenomenon of interest. This implies that the qualitative approach provides the researcher with an opportunity to select the sites where relevant and useful data can be gathered. In the context of the present study, a qualitative research approach helped the researcher to identify schools that do not only have Grade 9 learners, but also offer environmental education as a cross-curricula component of the curriculum for the General Education and Training band and are therefore able to provide the in-depth information needed for by study.

Qualitative research is fundamentally interpretive. This means that the researcher derives meaning from interpreting the data collected. In the case of this study, the interpretive process consists of a description of an individual or setting where the research was conducted, the analysis of data for the identification of themes or creation of categories, and finally the interpretation or drawing of conclusions about the personal and theoretical meaning of the study. In this regard, Wolcott (1994, cited in Creswell 2003:182) suggests that one cannot escape personal interpretation in qualitative data analysis. Thus, an inductive approach was used to analyse and interpret the data in this study.

1.9 RESEARCH APPROACH

Qualitative research requires a researcher to provide a plan for choosing sites, participants, and data collection techniques. Qualitative researchers may investigate small and distinct groups as participants in a particular institution, all the subjects in a selected room, one principal's role during an academic year, or one institution. The aim of such an investigation is to develop an understanding of the small group considered. It must be noted that some researchers do choose multiple sites corresponding to subsets of larger groups.

In the light of the above, this research is a case study of Grade 9 Natural Science teachers – in schools situated in the Capricorn District of the Limpopo Province – who implement environmental education as a cross-curricula component in the Natural Science learning area. The investigation focused on Grade 9 Natural Science teachers of the General Education and Training band. The researcher studied the subjects in the relevant schools for a certain period of time. The main reason for using a case study approach in this study is that it allows the

researcher the opportunity to discover the important questions that need to be asked as she learns about and observes participants in practice over a prolonged period. A case study approach helps educational researchers with the continual stimulation of new ideas (McMillan & Schumacher 1997:132). However, this researcher chose to use the case study approach because it allowed the researcher enough time to establish cause and effect while she observed teachers implementing environmental education in a natural setting. As a result, the researcher was able to gather more in-depth information on the social interaction, context, motivational influences and knowledge which influence the relevant teachers' sense-making and responses to the policy. This served as a powerful determinant of how Grade 9 Natural Science teachers understand and interpret curriculum policy implementation and also what influences their understanding of the curriculum policy. The case study approach portrayed the reality of Grade 9 Natural Science teachers' influence of teaching experience, beliefs and practices regarding the implementation of curriculum policy. Furthermore, the case study approach offered opportunities to learn more about what encourages or discourages teachers from responding to the policy that stipulates the provision of environmental education.

Although case studies have disadvantages, the use of the case study approach in this research helped the researcher to gain ample information, information that she would not have been able to gather if she had used a different research approach. This is because, through the use of a case study approach, this study was able to respond to the questions relating to how Grade 9 Natural Science teachers understand, and why they respond to, the policy regarding the implementation of environmental education. As such, the case study approach provided a thick description of Grade 9 Natural Science teachers' understanding and interpretation of curriculum policy.

1.10 DATA COLLECTION TECHNIQUES

From a cognitive research perspective, decisions concerning any instruments are tied to the purpose of the study and the structure of its design. As such, the selection of the primary instruments for qualitative methods is not dependent on the researcher. However, as the main research instruments, researchers may also use other instruments to collect additional qualitative data to validate and clarify the existing data (Denscombe 2003: 273).

Qualitative data collection techniques or instruments were used in this study because they allowed the researcher to learn more about the central phenomenon of interest (McMillan & Schumacher 1997:137). These instruments were also helpful in gaining an understanding of participants' perceptions and views on the implementation of environmental education as a cross-curricula component within the Natural Sciences learning area. In order to draw more in-depth verbal information from the participants and other sources, the study employed interviews, document analysis, and observations as its main data collection instruments.

1.10.1. Observation

The study relied on observations to provide an in-depth understanding of how and why Grade 9 Natural Science teachers understand, respond to and implement the curriculum policy regarding environmental education within the Natural Science learning area in the classroom. The purpose of observing is to give the researcher direct, first-hand experience of the phenomena under study (McMillan & Schumacher 1997:137-143). Employing observation as one of the data collection instruments gave the researcher enough time to observe four Grade 9 teachers who were responsible for Natural Sciences in the classroom. The observations focused on how these teachers implemented environmental education within their learning area over a period of time. The researcher concentrated on recording the constructed realities as demonstrated by the participants (McMillan & Schumacher 1997:140). One advantage of using participant observation is that it is unstructured and the researcher may be able to record significant information that, at face value, looks insignificant. Thus, detailed descriptive field notes were made and analysed to construct meaningful themes, ideas, and other findings as suggested by McMillan and Schumacher (1997:173).

Since this is a case study based on multiple sites, the researcher observed 12 lessons in total offered by four Grade 9 teachers responsible for the Natural Science learning area of the General Education and Training band in three different schools. Only four teachers were observed because the fifth teacher was not comfortable with observations, but was willing to be interviewed; this must be taken into consideration when data is analysed. In each observation, the researcher was specifically looking at: how these teachers integrated environmental education into their Natural Science teaching; learners' involvement;

classroom set-up; and the different teaching strategies used in the classroom. In order to capture enough data or information, the researcher relied on both note-taking or field notes and the use of verbal recordings. Later, an analysis of the recorded data was made. The researcher observed four and interviewed, individually and on different occasions, all five of the Grade 9 Natural Science teachers who formed the sample for this study.

The entire process of data collection ran from September 2013 to April 2014, a three-month period. The researcher engaged in the teaching practices of the five teachers for a period of three months in order to learn through observing them. Observations were done four times every month, or once every week. The researcher chose to conduct these observations this way in order to have enough time to analyse both the recorded data and the field notes from each and every observation. These observations were followed by interviews aimed at validating what had been observed during the lessons. The four Grade 9 Natural Science teachers were observed as follows: two of the four teachers were observed three times, one was observed twice and the other one was observed four times. The observation schedule was spread over a period of three months, and covered different topics. This was done in order to learn how teachers teach different environmental concepts in the classroom as scheduled in the pace-setters for the different quarters of the year in order to develop an in-depth understanding of what influences the teachers' response to curriculum policy implementation.

1.10.2 Interviews

Interviewing is one of the major tools for data collection in qualitative research. According to Bogdan and Biklen (1996) quoted in Creswell et al. (2000:67) an interview could be described as “any conversation or interchange of views between two or more people on a topic of mutual interest, with emphasis on the social situations that provide research data” (Cohen et al. 2000:67). Interviews represent a direct attempt by the researcher to obtain reliable and valid information. The purpose of interviewing is to allow the researcher “to gather descriptive data in the subject's own words” and to access unobservable variables (Creswell et al. 2000:67). The researcher can conduct interviews with the participants face-to-face, by telephone, or by means of focus groups comprising six to eight interviewees (Creswell et al. 2000:67). These interviews are generally unstructured and “intended to elicit views and opinions from the participants” (Creswell 2003:20). In this study, face-to-face

structured interviews were conducted by appointment in order to have enough time to talk with teachers to explore how social interaction, context, experience, beliefs, and expertise influence the ways in which they make sense of the educational policy. Interviews with teachers provided better understanding of how and why teachers respond to the implementation of curriculum policy in schools and through these interviews Grade 9 Natural Science teachers were able to clarify what influences their understanding of curriculum policy implementation.

The primary advantage of interviews is that they provide much more detailed information than is available through other data collection methods. Interviews are also useful when one wants detailed information about people's thoughts and attitudes (Boyce & Neale 2006:3). The researcher interviewed all five teachers individually after the observations had been conducted. Interviews were used to validate what had been observed during the lessons and also what document analysis had revealed in terms of teachers' understanding of curriculum policy and how they react to its implementation. The interviews conducted by the researcher were helpful in that they enabled her to discover participants' current perceptions and views regarding the implementation of environmental education within the Natural Sciences learning area of the General Education and Training band. In this regard, data were collected by means of tape-recorded semi-structured interviews conducted with the selected school teachers responsible for Natural Sciences learning in Grade 9.

1.10.3 Document Analysis

Documentation refers to both public documents (e.g. policy documents, empirical research, minutes of meetings, official reports) and private documents (e.g. personal journals and diaries, letters, internet information) that were analysed in the context of this study. It is very difficult to get access to documented information, because information in this form may be protected. As such, it requires a researcher to search for the relevant information in hard-to-find places. The researcher used document analysis as a data collection tool in this study in order to get additional data on what informs the implementation of environmental education in schools in the GET band. The researcher chose this data collection technique because it provides data that are thoughtful, in that participants have given attention and time to compile such information and that such information can be accessed at the researcher's convenience and can be used as an unobtrusive source of information (Creswell 2003:23).

The purpose of documentation is to provide additional information, as well as to clarify or verify data obtained from other sources. To get additional information on the implementation of environmental education across the curriculum, the researcher used both public and private documents that verified and clarified data gained from both interviews and observations. Empirical research studies from the documented data were used to understand how other researchers view the implementation of environmental education in the classroom.

1.11 DATA ANALYSIS

As with data collection, the procedures for data analysis are unique and specific to qualitative research. This involve working “with data, organising them, breaking them down, synthesising them, and searching for patterns, discovering what is important and what is to be learned, and deciding on what to report” (Bogdan & Biklen, 1992:153). In qualitative research, data can be analysed during or after the data collection (Denscombe 2003:285). In the context of this study, data was analysed using Giorgi’s (2009) phenomenological steps in which data analysis begins while the interviews are still underway. Such a preliminary analysis gives the researcher an idea on how to redesign questions so as to focus on central themes as the researcher continues with an interview. After completing the interview, the researcher began with a more detailed analysis of what she had gathered from the participants (descriptive data). The researcher also formulated an overall explanation based on the additional themes and concepts discovered in the literature review and the conceptual framework.

1.12 ETHICAL CONSIDERATIONS

The researcher wrote a letter to the Provincial Department of Education requesting permission to collect data from schools situated in the Capricorn District of the Limpopo Department of Education. After permission was granted, she designed a consent form to be signed by participants. This form indicated how information was going to be collected, and explained the procedures to be followed during the investigation. The consent form also clarified how the participants’ privacy would be safeguarded and how the confidentiality of the information they provided would be ensured. The researcher pledged to protect the information collected from public scrutiny until the actual publication of the research. She treated all the participants with respect and due consideration.

The above behaviour is informed by Cohen et al. (2000:62) who stress that it is crucial to ensure that participants' right to privacy is always protected through the promise of confidentiality. This means that, although the researcher is aware of the participant who provided specific information, the information will be used only for the purpose of research and the name of the participant will not be attached to the information given. In his account of confidentiality and the right to privacy, Kimmel (1988), cited in Cohen et al. (2000:62), noted that one general finding that emerges from the empirical literature is that "some potential respondents in research on sensitive topics refuse to cooperate when assurance of confidentiality is weak, vague, not understood or thought likely to be breached". The researcher ensured confidentiality by not using the names of the respondents or of the schools.

1.13 DEFINITION OF TERMS

1.13.1 Curriculum

Curriculum involves all planned experiences that occur between learners and teachers in schools, and which are aimed at achieving broad outcomes and related specific ones (DoE 1999:79).

1.13.2 Curriculum Implementation

Curriculum or policy implementation entails putting into practice the officially prescribed courses of study, syllabi, and subjects. The process involves helping the learner acquire knowledge or experience. Curriculum implementation can only take place when there is a learner (DoE 1999:79).

1.13.3 Policy

A policy is a general plan of action or way of doing something which is prescribed by a specific body. A curriculum policy is a plan of action prescribed by the government which, through the policy, outlines its vision and plan of how things should be done (DoE 1999:79).

1.13.4 Environmental Education

Neluvhalani (2000:7) defines environmental education as "a process that seeks to develop the necessary knowledge, understanding, values, actions, skills, and commitment to allow

people (teachers, learners, and the community as a whole) to proactively secure a healthy and properly functioning sustainable environment”. In Chapter 2, (paragraph 2.2), environmental education is described as one of the ways in which people can respond to the environmental crises that exist both globally and in South Africa.

1.13.5 Grade 9

According to the DoE (2002:104), Grade 9 is the third and final year of the Senior Phase in the General Education and Training band in South Africa. This phase comprises Grades 7, 8 and 9. For the purposes of this study, only Grade 9 teachers responsible for Natural Sciences were considered.

1.13.6 South African Education System

The South African Education System is the national curriculum policy used in South Africa and which prescribes what should be taught in schools and how. The National Curriculum Statement of South Africa provides for Grades R to 12; this curriculum is written by South Africans for South Africans who uphold the principles and practices of democracy (DoE 2002:10).

1.13.7 Natural Science

Natural Science is one of the learning areas in the National Curriculum Statement. It promotes scientific literacy by focusing on the development and application of scientific knowledge and understanding and by fostering the relationship between science and society and the latter’s responsibility towards the environment (DoE 2002:104).

1.13.8 Implementation

Implementation is the strategic planning or a process of introducing a new discipline in the school curriculum which requires the full involvement of responsible stakeholders from the initial stage (DoE 1999:79). The successful implementation of environmental education depends heavily on teacher participation.

1.14 PROGRAMME OF THE STUDY

In order to foster understanding, this study has been demarcated into five chapters, as follows:

- ❑ Chapter 1 provides a comprehensive background to the study, through a detailed introduction.
- ❑ Chapter 2 provides a critical review of the literature on the theoretical background of the integration of environmental education into the curriculum, policy implementation, and teachers' sense-making of and response to policy implementation.
- ❑ Chapter 3 focuses mainly on the research methodology. It includes a description of and motivation for the selection of methods and instruments or techniques used to collect data.
- ❑ Chapter 4 provides a detailed analysis of the data, and takes a critical look at the findings of the research and the interpretation of data.
- ❑ Chapter 5 summarises the entire study by providing a detailed outline of the educational implications of the implementation of environmental education in the classroom, the recommendations of the study, and a conclusion.

CHAPTER 2 : LITERATURE REVIEW

2.1 INTRODUCTION

This literature review provides an overview of research on the implementation of the curriculum policy on environmental education, the teaching and learning of environmental education in the classroom, and teachers' sense-making of the curriculum policy. In other words, this review endeavours to present some empirical and theoretical research perspectives, as well as some debates on the topic. The aim of this literature review is to discuss what has already been investigated on the topic of environmental education. The ultimate objective of the review is to highlight the gaps in the existing knowledge and indicate what the current study could possibly do to improve the understanding of the factors that hinder the implementation of environmental education in the classroom.

In spite of the various initiatives taken to encourage and facilitate the implementation of environmental education as a cross-curricula strategy, much of the responsibility has been left to the teachers, who are expected to respond to and make sense of the policies that inform the provision of environmental education in schools. The rationale for the present study is the imperative to develop an understanding – from teachers' perspectives – of the factors that influence their response to, and interpretation of, the policy on environmental education. The study particularly examined Natural Science teachers' perceptions of this policy, as well as how they create and use the available opportunities to ensure successful implementation of the policy on environmental education within the Natural Sciences classroom.

2.2 ENVIRONMENTAL EDUCATION DEVELOPMENTS IN SOUTH AFRICA

Environmental concerns have been emphasised in many policy documents in South Africa. Examples of such documents include the Reconstruction and Development Programme of 1994, the White Paper on Education and Training of 1995, as well as the Bill of Rights of the new South African Constitution which mandates a healthy environment for all citizens (Le Grange & Reddy 2000:101). Furthermore, recent policy processes have emphasised the need for teachers to be actively involved in the designing of curricula and curriculum development processes. The Green Paper on Higher Education Transformation of 1997 states that "South

Africa's transition from minority rule and apartheid to a democratically elected government requires that all existing practice, institution and value are viewed anew and rethought in terms of their fitness for the new era." In the national government, the Department of Environmental Affairs and Tourism has played a key role – in partnership with various bodies which include the Environmental Education Association of South Africa – in motivating the inclusion of environmental considerations in the school curriculum. The Revised National Curriculum Statement – which is grounded on Outcomes-Based Education and a learner-centred framework for teaching and learning – was introduced, with the aim of transforming the South African education system. This policy acknowledges environmental education as a component in each of the eight learning areas in the curriculum for the General Education and Training band. It also guides the implementation of environmental education within all the learning areas of the curriculum for the General Education and Training band and expects teachers to play a primary role in its implementation (DEAT 2001:15).

This development, for the first time, gave general formal recognition to environmental education in the South African school curriculum. Thus far, some teachers and schools have initiated some environmental education activities, with the support of education department staff that have an interest in environmental education (DEAT 2001:15). Several national and provincial governments, para-statal bodies, and many NGOs have supported school-based environmental education activities. This support has often taken the form of the development of teacher and learner support materials (as in the case of Share-Net resource network) and school group visits to various environmental education centres in South Africa. It is important to note that these agencies have often been the only supporters of environmental education that teachers could call upon. However, these activities have generally been uncoordinated and, at times, poorly articulated in school programmes and curricula. This has had a negative impact on the teaching and learning of environmental education in the classroom (Lotz-Sistika 2002:105). Consequently, the National Environmental Education Programme for the General Education and Training band was launched in 2001 in an effort to address the issues relating to the incorporation of environmental education in the new curriculum for the General Education and Training band.

These initiatives are evidence of a growing national commitment to environmental education processes. This commitment was articulated as early as 1995 in South Africa's White Paper

on Education and Training. This national policy document stresses that environmental education – which should involve an interdisciplinary, integrated, and active approach to learning – must be a vital component of all levels and programmes of the education and training system. This will lead to the emergence of “environmentally literate and active citizens” who will ensure that South Africans, present and future, enjoy a decent quality of life through a sustainable use of resources (DET 1995:20).

Although theoretically appealing, the policy on the introduction of environmental education across the curriculum poses many practical challenges. It is often argued that if the aims of environmental education are to be achieved, teachers must be actively involved in the planning process. As such, attention should also be given to overcoming the impact of school organisational factors that predispose teachers to adopt teacher-centred classroom practices (DET 1995:33). Therefore, the need to respond to the afore-mentioned policy developments, as well as the researcher’s belief that teachers should play a central role in curriculum development processes, account for the decision to investigate teachers’ implementation of environmental education across the curriculum in this research.

Several studies have identified a number of issues that affect the ways in which teachers understand and respond to the educational policy (McLaughlin 1987; Spillane 1998; Spillane et al. 2002; and Hope 2002). In South Africa, like in many other countries, teachers are the ones to respond to the policy and make sense of it in their endeavour to implement it. The Revised National Curriculum Statement is the main policy that guides the provision and transformation processes of the South African schooling system, the teaching and learning in each and every learning area of the entire curriculum for all grades (DEAT 2001:15). As mentioned earlier, numerous studies on the implementation of environmental education have focused mainly on the constraints and factors that impede its success (e.g. Monroe and Cappaert 1994; Powers 2004; Pace 2003; and Robertson & Krugly-Smolka 1997:311-326). The major concerns raised by teachers vis-à-vis the integration of environmental education in the curriculum relate to their busy daily schedules, limited time, and lack of resources and training.

Research on policy implementation “around the world indicated that many educational reforms designed to improve the quality of schooling, as well as teaching and learning, have been more rhetorical than substantive in terms of their impact on the organisation of schools

and classrooms” (Morris & Scott 2003:71-84). Although some changes do occur in schools and classrooms, their extent and direction are sometimes inconsistent with the intentions of the educational policy initiative. This is precisely because those who vote policies into law are not responsible for their implementation in the social context (Hope 2002:40-44). Generally, once a policy is enacted at the provincial level, it makes its way to bureaucrats in the Department of Education. The latter then translate it into implementation language. When the policy is coded and infused, local implementers must then translate the policy into reality, in line with the ideas of policy makers. Nevertheless, local implementers usually find it challenging to be consistent in their implementation of a policy. This is mainly because they are not the ones who elaborated its content and voted for it. At the same time, those who voted for what is in the policy hardly know the realities of what is happening in the classrooms and schools. Such a situation forces implementers to oppose the policy or modify it according to their ideas of what should happen in schools. This situation applies to South Africa where a substantial body of literature has documented the existence of a gap between the intentions of policy makers and those of the implementers of curriculum policies. This gap is particularly noticeable in reforms geared towards changing the prevailing teaching and learning styles so as to improve the quality of teaching and learning in the classroom (Morris & Morris 2000:71-84).

2.2.1 Environmental Education within the Curriculum in South Africa

The curriculum policy on environmental education has been largely discussed, debated, and finally endorsed as part of the entire GET curriculum, as highlighted above. However, school teachers who are the primary implementers of the environmental education policy in the classroom situation do not receive the necessary support. Indeed, Lotz-Sistika (2002:105) observed that most often teachers are found to be struggling with the teaching of environmental education in the classroom for different reasons. Some teachers view environmental education as an extra load which compounds what they already have, instead of a relevant and meaningful way of creating links across the curriculum (Clacherty 1993:23-40). An important reason for integrating or linking environment and education in South Africa is that environmental education contributes significantly to the transformation and development of South African society. Citizens who are environmentally literate are able to make wiser decisions that take into account the effects of development on their environment.

Furthermore, they can work actively to reverse environmental degradation. Finally, they can manage and use the country's natural resources more wisely and democratically.

Environmental education is identified as an integral part of each learning area of the curriculum. For educators, this means that environmental learning must occur throughout the curriculum and should not be restricted to a specific learning area. For learners, it means that all learners within the General Education and Training band (Grades R-9) will be exposed to environmental education which now forms part of each and every learning area in their curriculum. Therefore, both teachers and learners should always regard environmental education as inseparable from the curriculum and their daily school activities (DEAT 2001:16). To be integral to the curriculum also means that environmental education becomes part of what constitutes the curriculum and cannot be considered as an add-on.

It needs to be noted that all learning areas are about people and the environment. This justifies the need to see environmental learning as integral to the curriculum. For example, when teaching about profit and loss in Economic and Management Sciences, reference is made to gains and losses incurred from the resources derived from the environment. Similarly, Social Sciences are about society's interaction both within the environment and with what it offers; Mathematics focuses on the ability to make correct calculations about environmental resources and population size, what people need in order to survive, how much is available today and how much will remain tomorrow for future generations; and Natural Sciences focus on how best to apply scientific approaches and skills in making a living out of the environment. The scientific knowledge generated by researchers and laboratories adds value to life in various ways. Technology helps to produce more from the environment, but also to reduce the levels of environmental degradation. This is achieved by providing people with opportunities to use alternative resources which reduce the pressure on the environment. Languages also play a crucial role, in that they enable people to communicate environmental hazards, and achievements linked to the environment. As for Arts and Culture, they help to retain images, memories, and sounds that constitute the environmental heritage of current and future generations (DEAT 2001:16).

More than ten years ago, Robertson and Krugly-Smolka (1997: 311-326) highlighted that, "environmental education represents a challenge to existing patterns of schooling". In other words, environmental education challenges the habitual patterns of teaching. In particular, its

emphasis on outdoor education clashes with existing organisational patterns (Robertson & Krugly-Smolka 1997:311-326). Nevertheless, environmental education should be integral to all the existing learning areas of the curriculum, and should be outcomes based. With the teaching of environmental education in the classroom, a learner-centred teaching approach is employed whereby learners are given opportunities to be actively involved and take responsibility for their learning. Unlike the old education system, the new environment-friendly curriculum allows learners to work in groups or teams in order to solve environmental problems relating to their schoolyards or communities. Different teaching strategies and methods can be used, depending on the aims and objectives of the lesson. Most often, what teachers want learners to achieve at the end of the lesson guides the type of teaching methods to be used in order to achieve the expected outcomes of the lesson (Van Der Horst & McDonald 1997:109-112).

Moreover, the effective use of resources and materials enhances the effective implementation of environmental education. Effective use of resources and materials entails making use of the available resources in helping learners to develop skills, knowledge, and attitudes that enable them to participate actively in solving environmental issues. One of the major challenges regarding the use of resources and materials relating to environmental education – in the formal curriculum – is teachers' education (DEAT 2001:17). This is because the application of environmental education programmes and the appropriate use of teaching materials and strategies in the classroom depend on suitably trained personnel who are responsible for putting the programmes into effect (Robertson & Krugly-Smolka 1997:311-326). It suffices to observe that even the best curricula and teaching materials cannot have the desired effect if the people who are responsible for their implementation have not fully understood the objectives of environmental education; and if they are not capable of directing the learning activities and experiments that form the basis of environmental education, or are unable to effectively use the materials available to them (Robertson & Krugly-Smolka 1997:311-326).

One of the guiding principles of environmental education is lifelong learning that caters for all ages in formal, informal, and non-formal situations, as well as all the socio-professional groups of the population (Tbilisi 1977:12). As such, Natural Science teachers are expected to be able to teach environmental education in and outside the classroom, and be capable of conducting outdoor activities that will help learners to develop different skills. In South

Africa, the National Environmental Education Programme for the General Education and Training band contributed towards the development and delivery of in-service teacher education. This project provided teachers with a professional development programme to support them with the integration of environmental education into all learning areas (DEAT 2001:20). Subsequently, some teachers were able to practically implement environmental education in their classrooms in different ways. Mucunguzi (1995:134-231) emphasised that environmental education should appear as a complete school programme in which theory and practice are combined. He added that the overall objective of this programme should be to train broad-based, skilled, and environmentally conscious citizens in all communities and provide a sound basis for the training of field extension workers. Therefore, teachers should be encouraged to adopt a problem-centred approach to teaching. The latter should start with the experiences of the learners, before introducing new innovations and knowledge to them.

2.2.1.1 The nature and scope of environmental education in the curriculum

Environmental education has been recognised, both locally and globally, as a solution to environmental problems and crises. In South Africa, as in other countries, environmental education is considered as a vital element of all levels of learning. The White Paper on Education and Training proposed the inclusion of environmental education in the curriculum in an interdisciplinary and integrated manner, as a central aspect of all levels and programmes of the education and training system (DET 1995:26). As a result, Natural Science teachers are expected to mediate learning through the use of different teaching strategies and media, and resources and materials. The emphasis should be on developing learners' understanding to enable them to make informed decisions and be critical in solving environmental problems (DET 1995:36-39).

Environmental learning can take place in non-formal, informal, and formal situations. However, it is essential that teachers have a thorough understanding of what environmental education entails. By being clear about the nature and scope of environmental education, teachers will then be in a position to identify teaching strategies that will enhance the quality of the environmental education taught and will enable the achievement of the expected outcomes of the lesson (DET 1995:20-33).

Environmental education is defined in many different ways by various authors. All these definitions provide information on the nature and scope of environmental education and

paint a picture of environmental education teaching (Loubser 2005:53-56). Nevertheless, some of the definitions are in contrast with others in their view of environmental education. For instance, the behaviourists' view of environmental education totally differs from that of the interpretivists (Van Der Horst & McDonald 1997:109-112). Although the focus has shifted away from trying to find a universally acceptable definition of environmental education, it suffices to note that the most durable definition of this concept has been the one developed in 1971 by the International Union for the Conservation of Nature and Natural Resources (IUCN), an international group that defines environmental education as “the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people, their culture and their biophysical surroundings. Environmental education also entails practice in decision making and self-formulation of a code of behaviour about issues concerning environmental quality” (Loubser 2005:56). The definition of environmental education proposed by the IUCN encapsulates what many environmental educators at that time regarded as the essential elements of the concept. These fundamental elements include the interrelationship between people and their environment, their culture and biophysical surroundings, their values, attitudes and behaviour towards the environment, and their skills – including decision making and the formulation of ethical standards (Loubser 2005:54-55). Lebeloane (1999) contends that the definition proposed by the IUCN promotes the view of environmental education as a process that involves both training and education; enables people to solve local and global environmental problems such as air pollution, ozone depletion, greenhouse effects and other environmental issues; encourages people to be more environmentally responsible; and is directed at environmental sustainability. Similarly, behaviourists, who share the IUCN's definition of environmental education, view learning as a response to a stimulus. They maintain that learning occurs according to the principle of the association between the stimulus and the response to such a stimulus. Apart from the definition of environmental education, the Tbilisi guiding principles of environmental education, which are often quoted from the behaviourist paradigm, also form part of the nature and dimension of environmental education (Van Der Horst & McDonald 1997:109-112). The above-mentioned guiding principles are as follows:

- ❑ Consider the environment in its totality, natural and social;
- ❑ Be a continuous lifelong process, beginning from the preschool level and continuing through all formal and non-formal stages;

- ❑ Be interdisciplinary in its approach, draw on the specific content of each discipline to achieve a holistic and balanced perspective;
- ❑ Examine major environmental issues from local, national, regional, and international points of view so that students receive insights into environmental conditions in other geographical areas;
- ❑ Focus on current and potential environmental situations while taking into account the historical perspective;
- ❑ Promote the value and necessity of local, national, and international cooperation in the prevention and resolution of environmental problems;
- ❑ Explicitly consider environmental aspects in plans for development and growth;
- ❑ Enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences;
- ❑ Relate environmental sensitivity, knowledge, problem-solving skills, and values clarification to every age, but with special emphasis on environmental problems;
- ❑ Help learners discover the symptoms and real causes of environmental problems;
- ❑ Emphasise the complexity of environmental problems and, therefore, the need to develop critical thinking and problem-solving skills; and
- ❑ Utilise the diverse learning environments and a broad array of educational approaches to teaching, and learn about and from the environment, with particular emphasis on practical activities and first-hand experience.

What is more, the dimensions of environmental education, namely, education about, in and for the environment, clarify the nature and essence of environmental education (Chambers 1995:24).

Learning in the environment is concerned with using education as tool for inquiry that enhances the development of skills, and experiences in the field of environment (Chambers 1995:24). In the environmental context, experiences can be the most powerful way to learn about and appreciate how the natural world works. “Outdoor experiences may be planned purely for fun, to raise awareness, or to develop specific understandings” (Stoltman, Lidstone & DeChano 2007:1-10). Through positive experiences in the environment, children can be helped to overcome fears of the environment and to establish that important sense of “connectedness” with nature (Sethusha 2006:162). Outdoor experiences provide opportunities to create awareness and learning, with the aim of developing skills. Indeed,

through them, learners can be introduced to such investigation methods as close observation of their surroundings, interviewing, and cooperative group work. The participants are afforded the opportunity to recognise things around them and they are taught how the environment functions.

Learning about the environment stresses environmental knowledge and understanding. In order to make a meaningful and positive contribution to the quality of the environment and meet the needs of the people, it is essential to first understand how the environment works. Indeed, many environmental problems faced currently are a direct result of ignorance. In order to appreciate the need to conserve the environment, children first need to understand the fascinating ways in which nature works. By understanding nature's cycles, interdependence, adaptation and diversity, people can better understand the impact that their actions can have on the environment (Sethusha 2006:162).

Given that the concept of "environment" includes politics, economics, and social issues, environmental education should encompass learning about politics, philosophy, economics, and how society's actions affect the biophysical environment.

Consequently, learning for the environment is concerned with the development of values and attitudes that direct positive action, based on a broad, balanced and informed consent. Education for the environment aims to promote a willingness and ability to adopt lifestyles that are compatible with the sustainable use of resources. It builds on the education in and about the environment to create awareness, responsibility, and motivation to take well-informed decisions and action. This is the most important form of environmental education, because it uses the environment itself as a context for learning. This is done through interactive activities aimed at developing a sense of empathy for the environment. Environmental education encourages learners to reflect on their learning and develop the necessary skills to act on what they have learned. It affirms the relationship that people have with the earth, and is grounded on real-life, active experience. Environmental education is empowering, it teaches learners to use their problem-solving and decision-making skills to help bring about change. Any effective environmental education programme should include activities that enable children to learn in, about, and for the environment (Chambers 1995:6).

According to Murdock (1993:3-14), environmental education involves learners in real-life experiences, assists learners in developing investigative skills, and uses a “hands-on approach” to learning. It also involves learners in co-operative learning, deals with value clarification and problem-solving, and encourages learners’ commitment to follow their enquiries with action. In this regard, the teachers’ responsibility is to help learners acquire an awareness of and sensitivity to the environment, develop the necessary skills for the investigation of the environment and for the identification and solving of environmental problems. Therefore, it is vital for teachers to become experts in the use of teaching strategies, as well as to obtain resources and materials that will guarantee the quality of teaching and learning in the context of environmental education as a cross-curricula component. The appropriate use of teaching approaches will also facilitate learning about, in and for the environment, with due emphasis on practical hands-on activities (Murdock 1993:3-14).

2.2.1.2 The implementation of environmental education in schools

Research on the formal implementation of environmental education has focused mainly on the challenges faced by teachers, that is, the factors that hinder the effective implementation of environmental education as a cross-curricula component in schools (Clacherty 1993:23-40). Powers (2004:3-11) identified time as one of the major factors hindering the effective integration of environmental education in the classroom. Indeed, in his research study, conducted between December 2001 and February 2002 in the United States, he found that although many teachers have shown some interest in integrating environmental education within their respective learning areas, time remains the most salient challenge to the implementation of environmental education across the curriculum. For their part, Monroe and Cappaert (1994:103) identified overloaded timetables and inadequate resources as the most common challenges to teachers’ integration of environmental education across the curriculum. They indicated that teachers find it difficult to integrate environmental education because their timetables leave very little time for environmental teaching. Pace (2003:28-35) conducted a similar research study, which also identified time and inadequate teacher training as the major obstacles to the integration of environmental education principles in the classroom. Teachers indicated that the duration of the training was very short, between two and three days. Thereafter, teachers are expected to put what they have learnt during those three days into practice in their classrooms, for the entire year.

Currently, some school teachers have incorporated the notion of environmental education across the curriculum as an interdisciplinary approach to teaching and learning in the curriculum for the General Education and Training band, with the support of non-governmental organisations and private entities (Clacherty, Sinclair & Lotz 1999:54). Clacherty et al. (1999:58-72) identified a number of schools that have incorporated environmental education programmes in their curriculum thanks to assistance from the Delta Environmental Centre. The Delta Environmental Centre (DEC) is a non-governmental organisation that has assisted many schools for many years. Since the introduction of the outcomes-based approach to education through the 2005 Curriculum, “environment” has become a key component of the programmes for all grades. The centre has helped educators from Gauteng Province, North West Province, and Limpopo Province to develop relevant learning programmes that deal with their local environmental issues or concerns (Enviropaedia 2004:76). The main goals and objectives of the DEC are to encourage teachers and students to become more effective through networking; to empower participants to take responsibility in addressing environmental and socio-economic issues; to encourage problem-solving and active participation; and, most importantly, to contribute to a sustainable environment through environmental education. These goals and objectives are achieved through the DEC’s programmes which are linked to the curriculum, with the emphasis on environmental learning. The DEC provides a range of school programmes, with activities directed to learners from pre-primary levels to secondary school levels. These programmes are presented in both outdoor and indoor settings. It is important to note that there are also programmes for tertiary institutions; these are meant to enrich tertiary level students’ personal experience as part of their respective training programmes. Workshops and training for teachers are offered in Gauteng Province, and these also accommodate teachers from the other provinces (Deltalk Newsletter 2004:14). Simmons (1998:17) contends that, in other areas, environmental education is not only taking place in the classroom, but excellent work is being done outside school premises to raise children’s awareness of environmental issues and encourage them to care for their environment. Simmons (1998:17) highlights the fact that many schools now have their own gardens, recycling schemes, and energy audits.

As indicated above, environmental education is not bound to the classroom situation. It extends beyond formal settings to informal and non-formal ones. Environmental education is an uninterrupted lifelong process that accommodates people from different age groups. The

South African National Biodiversity Institute, for instance, provides school programmes for both teachers and learners. These school programmes offer a wide variety of fun-filled environmental education activities. They encourage learners to discover their environment and, in the process, learn more about indigenous plants and ecology. The practical, hands-on approach adopted fosters the development of such skills as the careful observation, recording, and analysis of data. These programmes are structured according to the outcomes-based model and integrate environmental education across all learning areas. These school programmes also offer teachers opportunities to stress the view of environmental education as an interdisciplinary approach to teaching and learning. As such, these programmes equip teachers with skills and knowledge regarding the use of teaching strategies and resources in environmental education.

Furthermore, within the South African National Department of Education, initiatives geared towards the implementation of environmental education within the formal curriculum have been taken. Commitments to introducing environmental education in the entire curriculum, at all the levels of education and training, have been made. Consequently, environmental education – as an interdisciplinary approach to teaching and learning across the curriculum for the General Education and Training band – has been introduced in many schools (NEEP-GET 2004:6-8). Through the National Environmental Education Project, the National Department of Education is investigating a variety of mechanisms that will facilitate ongoing professional development and activities that will improve the delivery of environmental learning in South African schools. The project also coordinates initiatives aimed at facilitating environmental learning at schools that are undertaken by other government departments and non-governmental organisations.

In his speech (National Budget Speech, Vote 3 of 2004), the former Minister of Education, Professor Kader Asmal, noted that although the principle of a healthy environment should permeate each learning area, resources that will enable teachers to deliver are also needed. To quote Professor Asmal at length:

“Many environmental resources have been developed, and with some modification would be appropriate for assisting teachers in preparing activities that can help learners to gain the necessary skills and knowledge. New resources need to be developed, and to this end the department has prepared guidelines for resource development, especially for the preparation or modification of environmental education resources. Teachers and learners

also require access to learning support materials. The National Education Portal, through its partnership with Share-Net on Environmental Education Resources, is an exciting new development. A partnership with the National Education Portal should be considered in the near future that would ensure teachers' access to the Internet at a low cost". (Asmal 2004).

To ensure the effective implementation of environmental education in the curriculum, the Department of Education has already developed strong partnerships with a range of non-governmental and community based environmental organisations – some from other countries – as well as with other government departments, particularly Environmental Affairs and Tourism, Water Affairs and Forestry, Health, and Transport. These partners have supported a variety of initiatives to support the curriculum in many ways (Enviropaedia 2004:76).

Although various initiatives have been taken to encourage and facilitate the implementation of a cross-curricula approach to environmental education, the responsibility to respond and interpret the policies that stipulate the provision of environmental education in schools has been assigned to teachers. Hence, this study aims to develop an understanding, from teachers' perspectives, of the issues that influence their response to and processing of the policy that informs the provision of environmental education.

2.2.1.3 The implications of environmental learning within the Natural Sciences learning area

Environmental learning is a central focus of the Natural Sciences learning area. This is because this learning area, like the other learning areas in the GET curriculum, contributes to learning about a healthy environment in some way or other (NEEP-GET 2004:14). It also aims to create an awareness of the relationship between a healthy environment, social justice, human rights, and inclusivity. These are the principles that underpin the Revised National Curriculum Statement, and are crucial to the attainment of the aims of the education system (DoE 2003). The Natural Science learning area aims to contribute to the development of informed, critical, and responsible citizens who are able to play constructive roles in a culturally diverse and changing society. It also aims to enable learners to contribute to the development of a just and democratic South African society.

The Natural Sciences learning area further envisages a teaching and learning milieu that recognises that the people of South Africa have a variety of learning styles, as well as culturally influenced perspectives. Natural Science learning starts from the premise that all learners should have access to a meaningful science education that has to be learner-centred. Pace (2003:31) notes the existence of an interesting overlap between the goals of environmental education and those of science education. This presents a possible strategy by which both sets of goals could be achieved through a cross-curricular infusion process. Such a cross-curricular infusion puts Natural Science teachers at the centre of this innovation and expects them to help learners understand the environment and their role in it, acquire skills that promote learning, and nurture an environmental ethic. Furthermore, this cross-curricular integration of environmental education expects teachers to assume an active role in establishing the curriculum structures, and also requires them to cement the infusion which includes the blurring of subject boundaries, relating content matter and context to the learners' community, adopting diverse and up-to-date teaching and learning experiences, and actively promoting a whole-school commitment to environmental education (Pace 2003:31-32).

The Natural Science learning area does not only provide access to meaningful education that helps learners to understand scientific knowledge and how it is produced, but also helps learners to understand environmental and global issues. It further aims to provide a foundation on which learners can build throughout life. The Natural Science learning area also promotes scientific literacy by focusing on:

- ❑ The development and use of science process skills in a variety of settings;
- ❑ The development and application of scientific knowledge and understanding; and
- ❑ The appreciation of the relationships and responsibilities between science, society, and the environment.

Environmental education focuses not only on these dimensions of reality in which man lives, but also on the complicated set of links between these different dimensions of the environment. Its basic aim, in this regard, is to succeed in making individuals and communities understand the complexity of both the natural and built environments. This complexity results from the interaction between their biological, physical, social, economic,

and cultural aspects. Consequently, people need to acquire knowledge, develop attitudes and practical skills that will enable them to participate – in a responsible and effective way – in the effort aimed at solving environmental problems (Tbilisi 1977:12).

In environmental education, the emphasis is on equipping learners with environmental knowledge and skills that will enable them to solve real-life environmental problems and to sustain the environment. Given that both subjects – environmental education and Natural Science – appreciate the environment and the relationship people have with it, they can be facilitated simultaneously. This implies that, within the Natural Science learning area, environmental learning can be integrated in such a way that issues pertaining to the environment can be taught. This is based on the fact that teachers involved in the teaching of Natural Science were found to be more environmentally knowledgeable than their counterparts in charge of some other learning areas (Swanepoel, Loubser & Chacko 2002:282). Nevertheless, all teachers need to adhere to the national curriculum policy that stipulates the provision of environmental education in the classroom, since it guides classroom practices.

2.2.2 Implementation of Educational Policies

Research on policy implementation around the world indicates that many educational reforms designed to improve the quality of learning have been more theoretical than practical. Although schools and classrooms do change, the extent and direction of this change are not always consistent with the intentions of policy initiatives (Morris & Scott 2003:71-84). This is due to the gap that exists between the intentions of policy-makers and those of the implementers of policy in schools. Thus, the notions of top-down or control models of implementation that can be used to achieve policy goals significantly influence the ineffectiveness of policies. This is precisely because, within centralised organisations, there are often problems with the transmission of policy intent from the most senior levels through the mid-level managers to the point of delivery. In this regard, Morris and Scott (2003:71-84) contend that many policies remain impossible dreams that cannot be implemented for different reasons. According to Sayed and Jansen (2001: 23), policy failures are due to a variety of factors. The next sections explain, in detail, the factors that affect policy implementation, opportunities for effective policy implementation and the approaches thereto, and the ways in which the process of sense-making takes place.

2.2.2.1 Constraints and challenges to educational policy implementation

Issues affecting the implementation of policy vary from one school, organisation or institution to another. A number of studies have revealed similar findings relating to the aspects that influence the implementation of educational policy. Hope (2002:40) underscores that “transforming educational policy into practice, regardless of the level from which it emanates is not an easy task”. The obstacles to implementing policy are numerous. They include, among others, implementers’ indifference or apathy towards a policy, lack of resources, insufficient time for implementation, and disagreement about how to achieve results. Spillane (1998:33-43) identifies the following as further factors that influence policy adaptation process: individual and institutional agenda; community attitudes; inadequate material resources; and insufficient time. To these must be added the fact that local educators interpret policies in light of their local vision; policies that fit local visions are endorsed, while those that do not are opposed or modified accordingly. The top-down organisational system is found to have an influence on the policy. Morris and Scott (2003:71-84) contend that within centralised organisations, there are often problems with the transmission of policy intent from the most senior level through the mid-level managers to the point of delivery. Many policies are not implemented because of the absence of financial resources and qualified personnel, or because they are unspecific or ambiguous (Elmore 1997:112). Many conventional accounts assume that policies fail because implementers do not understand their intended messages which are clouded by ambiguity.

Spillane et al. (2002:387-512) remark that implementation agents fail to notice, intentionally ignore, or selectively attend to policies that are inconsistent with their own interests and agendas. They are likely to implement policies that are in line with their agendas and reject or alter those that do not advance their interests. Some factors that influence policy implementation relate to principals’ inability to formulate clear policy outcomes or to adequately supervise the implementation process. The inability of state or federal policy makers to craft clear policies and implementing agents or agencies can undermine local policy implementation (Spillane et al. 2002:387-512). This is compounded by the behaviours relating to the fact that policy targets change and the magnitude of the change sought affects the likelihood of a successful implementation. This is because policies that press for incremental changes are more likely to compromise positive response and the

implementation process thereof. The authors further note that some conventional accounts also stress implementation problems resulting from implementing agents' limited understanding or misunderstanding of policies. Implementation, at a minimum, requires a shared understanding among participants concerning the implied presuppositions, values, and assumptions that underlie the whole implementation process. Once participants understand these, then they have a basis for rejecting, accepting, or modifying the policy in relation to their own school, community, and class situation. Inadequate or lack of communication among the agents and agencies results in misunderstanding of the policy. This affects its implementation.

Cohen and Spillane (1992:143-175) contend that the governance system and organisational arrangements that structure principal-teacher relations influence policy implementation. This is usually apparent when the responsibility for policy making is not clearly demarcated or defined in the various branches and levels of government that exercise policy jurisdiction. These arrangements complicate principal-teacher relations because they are often unclear about which policy signals teachers should attend and adhere to, and to whom they are accountable with regard to implementation. Hope (2002:40-44) supports this claim when he contends that, with the implementation of educational policy, there are some considerations for principals to ponder. This is because successful policy implementation also depends on principals' ability to influence the behaviours of teachers and other non-teaching staff.

According to Reimers and McGinn (1997:71), a conventional view of policy analysis and planning assumes that it is possible to reduce uncertainty about the future by a projection of the past. In the conventional perspective, although isolated individuals or small groups can do the formulation of policies and plans, the intended results are always social and collective. In the conventional perspective, decision makers use their knowledge to identify the action that implementers should take. In other words, those who decide what should be in the policy are seldom those responsible for policy implementation. Within the conventional perspective, there seems to be a separation of knowledge from action which is conceptually and practically problematic (Reimers & McGinn 1997:71). In most situations, people who generate knowledge are not the ones who formulate the policies; they are also not the ones who carry out policy implementation. In such a situation, it becomes difficult, and almost impossible, for implementers to have the same knowledge as policy makers. This does not enable the former to implement the policy as intended. According to Reimers and McGinn

(1997:71), in practice, policy makers have not followed policy advice from researchers and, as a result, “policies and plans have not been implemented as intended”.

Reimers and McGinn (1997:71) identified a few reasons that are associated with policy failure within a conventional approach. The first reason for the failure of policies is that implementation is treated as a process that is separate from decision making. The second reason policies fail is because insufficient attention is given to those who will be responsible for their implementation. The third reason policies do not reach schools is the absence of conditions that facilitate the dialogue between policy makers and policy implementers. The fourth and last reason policies fail is the dictatorship exerted by policy makers who do not know the realities and challenges faced by local implementers.

2.2.2.2 Opportunities for successful implementation of educational policy

As mentioned above, educational policy implementation is accompanied by several constraints that challenge the smoothness of the implementation process. Hope (2002:134) observes that school districts and educators are continually broadsided with new policies to implement; under such a policy siege, they struggle to find time, resources, commitment, and motivation to meet policy implementation demands. Within the school context, principals are the most important sources of help with regard to the implementation of educational policy. They are key agents in virtually every aspect of school life; principals, with the support from the Department of Education can be initiators who get projects started; innovators who develop new ideas; communicators who disseminate information; and motivators who exhort others to reach their goals and objectives of their schools. According to Hope (2002:134), for policy implementation to be successful, principals should:

- ❑ Embrace the educational policy

A principal’s failure to embrace an educational policy places that policy at risk of delayed or inadequate implementation. The positive public reception that a new policy receives from a school’s principal conveys a message to teachers and non-teaching staff. Conversely, a negative reception by the principal may reinforce resistance to the new policy. The principal’s attitude can influence teachers’ disposition toward the policy and its training component.

- ❑ Conceptualise the policy in the school context

It is the principals' role to first conceptualise the policy in the school context. They must take a leading role in creating a vision of the policy and its meaning for the school. The vision serves to motivate teachers and non-teaching staff to focus their efforts on attaining the goals of the school. Principals should see to it that the articulated vision of the policy highlights the benefit to be derived from its implementation and that this vision embodies benchmarks that are practical and attainable.

- ❑ Provide staff development for successful policy implementation

Staff development must be an integral part of the policy implementation process. Indeed, staff development provides knowledge of the why, what, and how of the policy. As such, it can diminish teachers' and non-teaching staff's anxieties and concerns. The development process provides staff with the tools and skills to perform the tasks associated with effective implementation. Principals must be alert to teachers' concerns about their lack of preparation to implement the full inclusion of new policies in the school and ensure that staff receive some training. Failure to provide such training for the teachers and non-teaching staff responsible for policy implementation can hamper the policy.

- ❑ Provide encouragement for policy implementation

It is rare that change meets no opposition; therefore, the principal must be prepared to promote policy implementation by way of encouragement. In this regard, praise and positive feedback are two forms of encouragement that provide motivation and support to teachers and non-teaching staff. Encouragement is a common tactic that boosts confidence and conveys trust and a belief that the implementer can perform the task. Regular recognition of teachers' and non-teaching staff's efforts is a way of encouraging continued implementation. Another form of encouragement is the application of pressure or "delicate supervision". It is believed that the change process is better carried out with support and pressure. The principal is ultimately responsible for the success or failure of policy implementation. Therefore, it is important for him or her to know who is effective and also where and when to apply this pressure in the form of support.

- Monitor and evaluate policy implementation

Monitoring involves inspection to determine if implementers are achieving the results intended by the policy and if implementation is congruent with policy makers' intent. Consistent monitoring is an important activity for principals. A principal's monitoring can include visiting classrooms to observe activities that are congruent with the policy; holding conversations with individuals regarding their experiences with policy implementation; and reviewing data from indicators that reflect change towards the achievement of the policy's goals.

2.2.2.3 Approaches informing educational policies

Several approaches that inform the process of policy implementation have been applied in different studies within the field of policy implementation. However, the efficiency and effectiveness of these approaches vary from one inquiry to another, depending on the broader aim of the inquiry. In other words, different approaches are or were used for different purposes. Reimers and McGinn (1997:71) describe the process of policy implementation in a cyclic form that comprises three approaches. In these approaches, they trace a progression in the relationship between a researcher and policy makers, as well as how the lines that separate implementers and decision makers fade as participation, ownership, and collaboration between them strengthen.

- i. Knowledge utilisation using precooked conclusions

Reimers and McGinn (1997:71) contend that, in this approach, researchers produce knowledge that can inform the choice of policies. However, the central preoccupation in this approach is what the researcher, as knowledge producer, does to influence the policy making process. They further note that the perspectives within this approach range from those proposing efforts to increase the effectiveness of dissemination to those that propose advocacy and social marketing as ways to persuade policy makers. What is common with these perspectives is the assumption that knowledge production and utilisation proceed in stages. The first stage involves knowledge creation and is the domain of the researcher. The second stage relates to dissemination and persuasion; here, the researcher tries through

various means to capture the attention of a seemingly passive decision maker in order to translate the results of the research into policy.

In the second stage, knowledge is used as the basis of information dissemination and, in the process, to explain the differences in culture between researchers and decision makers. The main concern of information dissemination is how to present a message so that it would be received correctly. Husen (quoted in Reimers and McGinn 1997:77) explains why education research fails to influence policy decision thus:

A major reason for the disjunctions between researchers and policy makers is ineffective dissemination. Research findings do not by themselves reach decision makers and practitioners. Researchers seek recognition in the first place among their peers. They place high premium on reports that can enhance their academic reputation and tend to look with skepticism upon popularization (Husen, 1994).

For their part, Reimers and McGinn (1997: 78) attribute the mismatches between research and policy to failures of communication, caused by such factors as messages being too long, the use of unfair terminology, the presentation of data in tabular form, the use of sophisticated analyses, and different timing. Clearly it is imperative for researchers to learn to use graphs, to avoid technical terms and to keep the messages simple. The main challenge in this perspective is how to package the message obtained from research in the best possible way so as to capture the attention of the policy makers.

After knowledge has been disseminated, there follows policy dialogue as persuasion. At this stage, once the policy analysts believe that they have the truth, they are required to abandon their neutral, disinterested stance as objective observers and interpreters of reality and intervene in the decision process. The main purpose of this process is to convince policy makers to act as the researchers would have them act and to adhere to what has been decided on, ignoring their personal interests (Reimers & McGinn 1997:80).

ii. Knowledge utilisation stimulated by providing decision makers with information

The approaches to the utilisation of knowledge discussed earlier emphasised the interests of the knowledge producer, who is not the ultimate knowledge user. This approach assumes

that the policy maker is at least as capable as the expert of identifying which information is most important (Reimers & McGinn 1997:83-106). The major distinction between the two approaches is that knowledge utilisation using precooked conclusions gives priority to the interests of the policy maker rather than those of the knowledge producer; whereas the knowledge utilisation stimulated by providing decision makers with information views both the researcher and the policy maker as equally capable. Nevertheless both approaches call for the participation of all who will utilise the knowledge. In the former approach, the only knowledge that is explicitly recognised is that which comes from the experts; whereas, in the latter approach, specific attention is given to the kind of knowledge contributed by decision makers.

In this approach, the knowledge utilisation stimulated by providing decision makers with information and the dissemination of research findings to inform policy remains a daunting task. This is because of the differences in thinking between researchers and policy makers. At best, dissemination contributes to enlightening the choices made; but, given the different worlds of the researchers and policy makers, it is hard to assess the impacts of this type of knowledge on decisions. This approach views policy dialogue as negotiation and not as persuasion. Although the two approaches view policy dialogue differently, they both regard the treatment of information as the product of a rational inquiry and as independent and external to the user of information. Unlike with the former approach, the decision maker is not a passive recipient of precooked conclusions drawn from research, but rather an active agent with interests and the power to select between alternative sources of information.

This approach further requires that those who are interested in pursuing a rational inquiry to inform policy engage their client from the onset. To avoid policy failure, research and analysis have to begin with the client in mind. This is to prevent them from being irrelevant to the issue of concern to the policy maker. This perspective is also characterised by a division between knowledge producers and knowledge consumers. Though there is a much higher appreciation for the client than in the former approach, and a higher appreciation for the importance of taking the client's needs and views into account from the outset of the generation of information, there is still a division of labour between the policy maker and both the researcher and the analyst. In the knowledge utilisation stimulated by providing decision makers with information, there is time for both of them to talk. It is the client who decides how the knowledge produced by the researcher is used and conceptualised.

However, the task of generating knowledge is still regarded as one that requires the independent work of a highly skilled professional specialised in methods of social science research (Reimers & McGinn 1997:106).

The next approach explains how the lines that separate consumers from producers of research vanish even further as policy makers and administrators become producers of the research they consume.

iii. Informing policy by constructing knowledge

The former perspective, knowledge utilisation using precooked conclusions, and the latter perspective – utilisation stimulated by providing decision makers with information – trace progression in the relationship between researchers and policy makers. The two compare a perspective that considers the former as producers of knowledge and the latter as consumers of knowledge to a perspective that regards policy makers as critical actors in the research process. In this perspective, informing policy by constructing knowledge, policy-makers select which products of research to consume and help researchers frame the problems to be investigated so that research can be most useful to policy (Reimers & McGinn 1997:107). In the previous perspective, policy analysts and experts are seen as mediators between the worlds of research and policy, but the two worlds are still considered as separate. This perspective extends the relationship between research and policy. It proposes that researchers and policy makers live not separately but in the same world and that, through the process of reciprocal influence, they construct knowledge together. The variations of this perspective differ from those of the previous two perspectives. The focus of this perspective is on the participation of senior policy makers in the research process. The other variation focuses on ministries of education, a complex bureaucracy. It proposes the participation of factors, at multiple levels, in the research process in and outside the education bureaucracy.

According to Reimers and McGinn (1997:107), these two variations of this view stem from two different ways of answering the question that seeks to establish who makes the policy. The first variation suggests that senior officials of the education bureaucracy make policies. The second variation postulates that policies are formed by all actors in an organisation and by external stakeholders whose interests are affected by the organisation. While the second perspective treats participation as an end in itself, it sees participation as a means to having

better policies. As a matter of fact, participation creates a sense of ownership of the policy reform proposal; this facilitates implementation. This perspective acknowledges the importance of participation and ownership for the successful implementation of education policies. Participation also improves the quality of the knowledge generated to inform the available options, because it brings the experience and perspectives of people who are directly affected by those choices to bear on the examination of alternatives. In contrast, the second approach views policy dialogue as persuasion; it considers policy design and implementation as the domains of the policy maker and not those of the researcher or the analyst.

This approach comes full circle, it proposes that once the researcher is prepared to listen to and understand the policy maker, and the two have worked together on designing and analysing the results of the research, the researcher can be invited to go beyond the realm of the analysis of the data. Thereafter, the researcher joins the policy maker in drawing inferences and establishing what should be done to address the problem they were trying to understand in the first stage. The dialogue between the researcher and the policy maker then moves naturally to the third stage which is concerned with the design.

The collaboration in the design stage helps the researcher to listen and try to understand the perspectives of policy makers. At this point, as both these groups collaborate to make meaning out of data, the dialogue flows beyond the data into what should be done to change and improve the reality that they have been trying to understand together. As the dialogue between the researchers and policy makers continues, the boundary between these activities softens. Together, they construct knowledge that can inform policy (Reimers & McGinn 1997:107-113).

iv. Research-based knowledge approach

According to Finch (1986: 5), as quoted in Smit (2003:175), conducting policy research and understanding how policy is implemented for lasting reform has been debated for many years. Finch (1986:5) argues that qualitative research played a minor role in policy-orientated research work. He provides a number of reasons for that. The first reason is that qualitative research methods were seen as soft, subjective, and tentative; while the dominant quantitative approaches were said to be hard, objective, and rigorous (Finch 1986:5). The

second reason is that research and policy were differently organised, research often took longer than the time policy makers were prepared to wait before coming to a decision. The third reason is that conceptually, the worlds of the policy maker and the social scientists differed; and that impacted on both their focus and approach to research and policy. The makers of social policy, including the education policy, relied mostly on recommendations emanating from quantitative data analyses, and neglected qualitative research (Finch, 1986:110).

Reimers and McGinn (1997:177) highlight that a research-based knowledge approach follows a fruitful strategy that involves identifying the multiple groups (stakeholders) that shape how education policies are formed, informed, and implemented. To maximise the impact of research on policy formation requires that these groups be considered as part of the process of generating research-based knowledge.

Like any other approach that informs educational policy, regardless of its merits, this approach does have some demerits. The main disadvantage of this approach is its belief that democratic decision making about the education policy is preferable to authoritarian decision making, and that the processes that allow the public scrutiny of policy decisions are superior to those that do not (Reimers and McGinn 1997: 177). As such, this approach views education policies as the outcome of a negotiation based on the value of democratic processes that involve different stakeholders who are affected by the policy in one way or the other.

According to Reimers and McGinn (1997:177), “the gap between implementation and policy is greater when the voices of the key stakeholders have been suppressed in the process of policy design”. It suffices to stress that implementation is the area where these voices can be heard. The main aim of the approach is to support decision making with research-based knowledge and to facilitate a dialogue which allows stakeholders to reach not only a negotiated, but also an informed outcome or policy. Research can bring fresh air and new perspective, but it has to be incorporated into a process of communication and participation by various stakeholders (Reimers & McGinn 1997:177-183). In this approach, organisational learning is encouraged, in that all stakeholders are involved in the process, rather than having a single individual from the top making policies for those on the ground to implement without knowledge of the reality on the ground. Clearly, dialogue is an essential condition

for organisational learning. With this approach, the expert must be willing to participate in dialogue with other stakeholders.

2.3 TEACHERS' RESPONSE TO AND SENSE-MAKING OF THE CURRICULUM POLICY

It was noted earlier that there are several factors that influence curriculum policy implementation and account for teachers' understanding or misunderstanding of the policy. In the conceptual framework section, the process of sense-making will be discussed and characterised in three different stages, namely, individual cognition, situational cognition, and policy signal. Although this process is characterised in these three different stages, different factors influence teachers' sense-making as they move from one stage to the next. Cognitive science scholarship suggests that what and how individuals make sense of new information or policy messages has much to do with their prior knowledge, expertise, values, beliefs, and experiences (Spillane et al. 2002:387-512). Teachers' prior beliefs and practices can pose challenges in that they may be unwilling to change their direction vis-à-vis the policy and the extent of their understanding "may interfere with their ability to interpret and implement the reform in ways that are consistent with the designers' intent" (Spillane et al. 2002:387-512).

When considering the role that prior knowledge, beliefs, and experiences play in shaping teachers' understanding of the policy and their relation to it, "the process of sense-making underscores the importance of unintentional failures of implementation, while still allowing for wilful misinterpretation" (Spillane et al. 2002:397). Accordingly, what is paramount is not simply that implementing agents choose to respond to policy, but also what they understand themselves to be responding to. Empirical research work illuminates the importance of agents' prior knowledge in their implementation of policy. Cohen and Weiss emphasise that "when research is used in policymaking, it is mediated through users' earlier knowledge", with the policy message "supplementing" rather than "supplanting" teachers and other implementing agents' prior knowledge and practice (Cohen & Weiss 1993:43-55).

All acts geared towards understanding policy require that the relevant agents access prior knowledge and apply it to guide the noticing, framing, and connecting of new ideas and events to what is already coded in memory. When implementers construct the understanding

of policy, they relate the new information or policy message to the knowledge they already have. The importance of accessing the known and familiar to make sense of the new stimuli (information) has “been a recurring theme in cognitive work on comprehension; drawing on early notions of building, and using schema from Gestalt and developmental psychology” (Spillane et al. 2002:50). The fundamental principle of cognition is that new information is always interpreted in the light of what is already understood. It is an individual’s prior knowledge and experience, including tacitly held expectations and beliefs about how the world works, which serve as a lens through which the individual notices the environment and shapes how the noticed stimuli are processed, encoded, organised, and subsequently interpreted (Spillane et al. 2002:387-512).

Studies on science teachers have revealed similar findings. This indicates that teachers incorporate reform ideas into their existing beliefs and understanding of epistemology and learning, and that teachers challenge reform when their tacit models conflict with the intent of policy. Teachers see new policies in terms of their current understanding; they interpret such science reforms as standards-based teaching and inquiry in terms of access to more textbooks (Spillane et al. 2002:387-512).

Beliefs and experiences have an influence on teachers’ sense-making of the new information or policy. Kane, Sandretto and Heath (2002:177-228) contend that beliefs vary in strength and kind; and, over time, they form a system or network. The stronger the belief, the more resistant to change it becomes. Several researchers, for example Kagan and Pajares (1992:62-90), observe that teachers’ beliefs and belief systems are grounded in their personal experiences which influence the way they make sense of policies; hence, teachers are highly resistant to change (Kane et al. 2002:177-228).

The way teachers make sense of policy is governed entirely by their prior knowledge, beliefs, and experience (Kane et. al 2002:177-228). In the sense-making process, teachers establish connections between the known and knowledge they have already gathered and the message or policy intentions. In this process, teachers tend to assimilate the new knowledge about instruction into their existing frameworks of understanding. In so doing, they usually construct understandings of policy ideas that fit into their existing models. Any ideas that do not fit, as Spillane (1998:35-36) has indicated, are unlikely to be implemented; at best, they will be modified so as to be in line with the teachers’ interests and agendas.

According to the cognitive frame, a number of issues influence implementing agents' interpretation of policy. Spillane et al. (2002:387-512) note that this framework involves three stages relating to the characterisation of sense-making during the implementation process. These are individual cognition, situated cognition, and the policy signal. Many of the issues and challenges associated with teachers' implementation of the environmental education policy in the curriculum are as a result of the above-mentioned three stages. Maila (2003:51-53) emphasises the centrality of individual cognition. In other words, he acknowledges that teachers, school managers, or curriculum support staff play a crucial role in the implementation of environmental education. In some schools, principals are perceived by teachers as unenthusiastic about environmental learning. Consequently, teachers are reluctant to participate in environmental initiatives that support the implementation of the environmental education policy in the curriculum. As a result of poor support from the principals, teachers are bound to respond to the curriculum policy in ways that are contrary to its essence. It is important to note that some of the principals' knowledge of environmental learning is still very shallow. Maila (2003:54) maintains that some principals see environmental education only in the light of competitions and environmental day celebrations. As a result, learners get involved in different environmental projects solely to win prizes.

Another challenge to teachers' favourable response to the curriculum policy on environmental education is the uncertainty about some principals' position vis-à-vis teachers' attendance of workshops on curriculum policy implementation, if given an opportunity. In some cases, principals think that teachers withhold some of the information when reporting back to the rest of the staff (Maila 2003:51-53). Currently, this is one of the burning issues with which teachers are confronted. Teachers attending teacher-training workshops find it difficult to relay information to their colleagues in a manner that retains the essence of what was conveyed by the trainer who facilitated the teacher training. Put in another way, teachers who were not in the training workshop find it difficult to understand their colleagues' report on the training. Once there is such an uncertainty among teachers themselves, it becomes very difficult for them to support each other; yet, this support is crucial.

Nevertheless, most teachers' response to and their sense-making of the new curriculum policy, is mainly influenced by the old schools of thought which generally allowed teachers to work individually, and to decide what and how they teach in the classroom. Conversely, the new curriculum policy encourages them to work together, as a team. For instance, the foundation phase teachers are expected to work together to develop learning programmes, work schedules, and lesson plans. The same expectation applies to the other phases. However, individual teachers' experiences, beliefs, and limited or lack of knowledge and expertise, hinder their ability to support or assist each other with regard to new the information that they receive. Networking is one of the strategies that can help teachers when implementing environmental education policy. However, because of their individual cognition, they prefer to work alone, without any consultation on any challenging issues.

Similarly, learners' response to the implementation of environmental education in the curriculum also has an influence on teachers' sense-making of the environmental education policy. Maila (2003:51) contends that in many instances, because of a lack of understanding of what environmental education is, learners see it as part of an afternoon activity that does not contribute to their academic performance. Therefore, when learners are asked to clean school premises, or water the school's food garden, they construe it as a punishment. Generally, they feel that only those who came to school late, trouble-makers, and those who failed their tests should do the above-mentioned tasks as part of their punishment. In other words, because of their limited knowledge about environmental education, teachers are usually unsuccessful in trying to explain to learners why they are expected to be involved in such activities. Clearly, teachers' inability to convince learners suggests that they need support from their knowledgeable colleagues and the Department of Education.

In addition to the individual's cognition, the teachers' work context also plays a critical role in their response to policy, and how they make sense of the curriculum policy. The way teachers receive and respond to the information has much to do with the type of school at which they work, as well as its management, enrolment, location, and the availability of resources (Spillane et al. 2002:387-512). The availability of resource materials at schools also influences teachers' sense-making of curriculum policy implementation in many ways. For instance, there are some schools that do not have basic resource materials to run their day-to-day activities, such as proper sanitation systems. In such cases, it becomes very difficult for many teachers to teach learners about healthy eating habits when they do not

have clean drinking water at school, let alone water auditing exercises. The lack of resource materials at schools is another factor that influences teachers' response to the curriculum policy with regard to their modification of the policy to meet the needs or suit the situation at their schools. Teachers may also opt to ignore the policy, if its intentions are practically impossible for them to implement at their schools (McLaughlin 1987:171-178).

The policy itself also influences the ways in which teachers receive and respond to it. According to Maila (2003:50), both international and national policies on environmental education contributed to South Africa's environmental learning policies. Before 1994, environmental education was not part of the formal education curriculum. In 1995, it was included in the White Paper on Education and Training document; and later, the policy statement on the environment was articulated in the National Curriculum Statement. The intention was to implement the environmental policy through one of the six-phase organisers. The Revised National Curriculum Statement came into existence in 2001 as a streamlined version of the 2005 Curriculum. It was grounded on the principles of social justice, healthy environment, human rights, and inclusivity. All the above-mentioned policy processes supported the inclusion of environmental education in the South African curriculum policy. However, the implementation of an outcomes-based approach to teaching and learning in the new curriculum, instead of the "old examination-orientated system", is disabling to most school teachers. Because of the processes of this policy, teachers feel that things are happening very fast. In other words, they struggle to keep up with the pace of the imperative to understand and implement the curriculum policy. Thus, instead of implementing the curriculum policy's actual intentions, teachers overlook or alter them so that they are in line with the teachers' own aspirations or the realities of their schools.

In this connection, Firestone (1989:151-164) points out that implementing agents tend to discard policies that are inconsistent with their own interests and agendas. Policies that serve their interests are more likely to be implemented, whereas those that do not advance their agendas are more likely to be either rejected or altered (Spillane et al. 2002:387-512). In the light of this, teachers need support from both school principals and the Department of Education. Indeed, the failure to provide teachers with the necessary support in terms of teacher development and training, networking, and other means might result in ineffective implementation or failure of the curriculum policy.

2.4 CONCEPTUAL FRAMEWORK

Environmental education, as an educational strategy, emerged in the 1970s. This field has been supported by a body of literature which includes numerous research studies. These have established theoretical frameworks for the learning and teaching of environmental education. The positivist, interpretivist, and critical perspectives are the ones that currently guide research in the area of environmental education. Although the acceptance of interpretivism is increasing in education, positivism remains the dominant research paradigm in both education and environmental education (Mrazek and Cantrell (1999:96). The positivist perspective believes in empiricism which views observation and measurement as the core of the scientific endeavour (Henning 2004:82-85).

This study seeks to understand policy implementation from a cognitive perspective. A key dimension of this exploration of the process of the implementation of environmental education is to gain an understanding on how and why Natural Science teachers interpret and respond to the transformative and instructional policies that guide their teaching practices in the ways they do.

Thus, the researcher draws on constructivist theory, a teaching philosophy grounded on a cognitive perspective of the policy implementation process. This is a teaching philosophy based on the concept that learning is the result of mental construction, where teachers construct their own understanding by relating to their personal experiences, incorporate new knowledge with what they already know. In the process an individual teacher creates his or her own schemas to make sense of the new messages. Undertaking a comprehensive review of the literature on the implementation of educational policy was mainly to engage, in depth, with the seldom-explored issue of how teachers make sense of and respond to the policy on the implementation of environmental education as a cross-curricula component, given that this policy challenges their traditional ways of teaching.

The power to decide what should be done or overlooked plays a significant role in the process of policy implementation, as currently defined by policy analysis (Spillane et al. (2002:387-512). The cognitive dimension demonstrates how this power to decide acquires content, based on the interplay between the policies that attempt to direct practices and the

ways in which that direction is constructed by local implementers. Therefore, the cognitive framework has been selected based on its ability to better articulate the implementing agents' understanding of the policy implementation process. This is in line with the study's aim of developing an understanding of how and why teachers interpret transformative policies. The cognitive perspective considers basic information about abstract ideas, the influence of motivation, as well as the ways in which social context and social interaction affect teachers' policy interpretation. Thus, this perspective will help the researcher in considering issues such as where teachers operate, the people available to support them, and their social interactions.

Scholars have increasingly applied a cognitive framework in studying the policy process (Surel 2000:495-512). Cognitive frames have also been used in studies on policy implementation in education by Cohen and Weiss (1993), Spillane (2000) and Kember (2000); on public policy by Weiss (1990), and Argyris and Schon (1978); as well as studies on political science, sociology, and social psychology by Whitty (2002). Within these areas, scholars have investigated how various dimensions of the sense-making process influence the implementation process. However, this study uses a cognitive framework in developing an understanding of how and why Natural Science teachers make sense of the policy and respond to it in the ways they do. The cognitive framework helps in articulating how teachers construct their understanding of the policy message, and their interpretation of their own practice.

A cognitive perspective maintains that behavioural changes have a fundamental cognitive component. However, a policy message about changing implementing agents' behaviour is not a given in that it does not reside in the policy signal (e.g. legislation, brochures, regulations and so on) (Spillane et al. 2002:387-512). Policy messages are not inert or static ideas that are transmitted unaltered to address local needs and conditions. Conceptualising the problem of implementation in this way focuses attention on how teachers, as implementing agents, construct the meaning of a policy message as well as how they view their teaching practices (Spillane et al 2002:387-512). According to Coburn (2001:2), sense-making is not a simple decoding of the policy message in general; it is also a process of interpretation that draws from the individual's rich knowledge base of understanding, beliefs, and attitudes. Differences in interpretation or action relating to understanding are necessary aspects of the human understanding process. To explore how their influence on

implementation requires the mechanisms by which teachers understand the policy and attempt to connect their understanding of it to classroom practice are investigated.

2.4.1 Stage 1: Individual Cognition

This component relates to an exploration of teachers as individual sense-makers, paying attention to how they notice and interpret stimuli and how their prior knowledge, beliefs, and experiences influence their construction of new understanding. Cognitive science scholarship suggests that what individual's make of new information is strongly related to their prior knowledge, expertise, values, beliefs and experiences. This component involves the application of the mechanisms of comprehension and sense-making to an analysis of teachers' interpretation of the policy and the complex practices of learning and teaching (Spillane et al. 2002:387-512). Zerubavel (2000:352) observes that individuals do not make sense of their world in a vacuum, their sense-making is situated in a particular "thought of communities" which includes – but is not limited to – professions, nations, political parties, religions, and organisations. Thus, it is important to understand that teachers' response and sense-making of the policy is influenced by a number of factors, some of which govern the teachers, such as the school organisation system. The impact of the education system on teachers' decision making in relation to teaching and learning also influences their sense-making of the policy (Clacherty 1993:23-40).

2.4.2 Stage 2: Situated Cognition

After exploring teachers as individual sense-makers and focusing on the issues that influence their sense-making of the policy in the process of the implementation of environmental education, the attention is now shifted to teachers' situational context. It is also imperative to understand the situation or context of the implementing agents. This is because it also affects teachers' sense-making of the new information (Spillane et al. 2002:387-512). In other words, it is crucial to consider how aspects of the situation or context in which they operate influence what implementing agents notice and how they interpret it. In this regard, the researcher will focus on such factors as social interaction, social contact, motivational influence, and how these influence teachers' sense-making of policy. According to Whitty (2002:139), teachers' beliefs, prior knowledge, and experiences might have a positive influence on their reception of the new policy, whereas the situational context might

negatively impact their sense-making of the policy, especially in schools where bureaucratic and authoritarian practices still prevail. In such conditions, implementing agents resort to ignoring or altering the new information so that it becomes suitable to their interest or agendas (McLaughlin 1987:171-178).

2.4.3 Stage 3: The Policy Signals

Although policy might be treated as one element of the situation, it has a special significance when considering issues of implementation. The design challenge involves representing ideas about instructions in ways that enable the implementing agent's sense-making. Inherent to this task is a critical tension between the abstract and the concrete in so far as communicating the idea (Spillane et al. 2002:387-512). Therefore, it becomes crucial to ensure a smooth flow of communication between policy makers and policy implementers. Effective communication between these two agents will help in solving problems that result from the gap between the policy makers' decisions and what local implementers are able to implement. Indeed, Firestone (1989:151-164) emphasises that implementing agents censure or modify aspects of policies that do not serve their own interests and do not further their agendas. Implementing agents' ability to ignore the policy is inherent to the nature of their work, which involves unpredictable human relations that are not reducible to programmatic routine or cannot easily be regulated and monitored from above. Thus, effective teacher support is necessary for the success of policy implementation.

2.5 CONCLUDING REMARKS

Implementing environmental education in the education system's curriculum is a major challenge. It rests largely on the ability of the key implementing agents to achieve what is implementable within the limits of the support they are given. Various studies have proven that policy implementation is affected by, among other factors, key implementers' levels of understanding, their beliefs, attitudes, knowledge, experiences, and the availability of resources.

It has been argued that environmental learning provides opportunities for both educators and learners to make use of the available resources in schools to teach and learn about the environment. Consequently, schools were encouraged to be environmentally aware and

active by using gardens to teach learners about environmental issues within the different learning areas. It was noted that some schools are doing well in this regard, while others are struggling. Hence, this study endeavours to develop an understanding of how teachers as key implementers of curriculum policies make sense of and respond to educational policies. In so doing, the study aims to expand the existing knowledge on curriculum policy implementation and contribute to the existing body of knowledge on teachers' sense-making of curriculum policies.

The next chapter focuses on the research methodology, the research design and approach, and methods of data collection.

CHAPTER 3 : RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the methodology and the research process followed in gathering information regarding practitioners' perspectives on the factors that influence their interpretation and response to the implementation of environmental education across the curriculum. According to Bogdan and Taylor (1975:75), the term methodology generally refers to the process, principles, and procedures by which researchers approach problems and seek answers. This study adopts a qualitative approach and uses a cognitive paradigm which guides the choice of methods. An understanding of the appropriateness of qualitative research methods depends on an understanding and valuing of the assumptions that underlie the selected paradigm (Mrazek & Cantrell 1999:34). The choice of a qualitative approach is justified by its ability to provide the information necessary to enable the researcher to answer the main research question posed in Chapter 1.

Furthermore, this chapter will explain how the data collection tools or techniques were used during the empirical investigation, and will describe the procedure followed in order to actualise the objectives of the study.

The chapter also explains the research design or procedure that guided the conduct of the study. The research design includes the sampling (selection of participants), the transcription of data, the analysis of data, and both the reliability and validity of the study.

3.2 RESEARCH DESIGN

According to McMillan and Schumacher (2006:22), a research design refers to the plan and structure of an investigation conducted to obtain evidence geared towards answering research questions. The purpose of the research design is to provide the most valid, accurate answers possible to the research questions. It is a very important aspect of an investigation, since certain limitations and restraints in interpreting the results are associated with the research design and determine how data should be analysed (McMillan & Schumacher 2006:23). According to Du Plessis (2005:148), a research design is described as a plan that guides the investigator in the process of collecting, analysing, and interpreting observations.

The main purpose of a research design is to help the researcher prevent a situation in which the evidence does not address the initial research questions.

The current study was based on a qualitative research design. This is because the researcher intended to collect descriptive data or participants' spoken or written words. This focus on participants' utterances is one of the features that distinguish qualitative research paradigms from quantitative ones (McMillan & Schumacher 1997:48). Simply put, within a qualitative paradigm, data collection techniques are used to capture both the richness and complexity of behaviours that occurs in a natural setting. Once collected, data can be analysed inductively to generate findings. This enables the researcher to get a detailed understanding about an individual or a place and to be highly involved in the actual experiences of the participants (Creswell 2003:20).

According to Creswell (2003:20), qualitative research uses multiple methods that are interactive and humanistic. It is important to note that the methods of data collection are growing, and are increasingly involving active participation by participants and showing sensitivity to them. This is useful to the researcher because the chosen approach involves teachers in data collection. Thus, in the light of the need to be sensitive to the teachers, the researcher wanted to establish a common understanding and credibility with the individuals involved in the study. The selection of the qualitative research approach is further based on the fact that it is emergent rather than tightly prefigured. As such, it provides the researcher with an opportunity to change her questions or refine them as she learns how to ask them and to whom they should be posed. It also offers an opportunity to change the data collection process as the research progresses. The qualitative research approach also helps to establish the best sites from which most can be learnt about the central phenomenon of interest to the research. In other words, it provides the researcher with an opportunity to select the site from which relevant and useful data can be gathered. In the context of this study, the qualitative research approach helped in identifying schools that have Grade 9 learners and that offer environmental education as a cross-curricula component of the curriculum for the General Education and Training band.

It suffices to note that qualitative research is fundamentally interpretive. This means that the researcher has to generate an interpretation of the data. In this regard, the researcher developed a description of individuals or of the setting where the study was to be conducted.

As indicated by Wolcott (1994) in Creswell (2003:182), “one cannot escape the personal interpretation brought to qualitative data analysis”. Therefore, the researcher analysed and interpreted the data inductively. Hoberg (1999:76) is of the opinion that qualitative research is based on a naturalistic inquiry where researchers use multi-method strategies to gather data. Qualitative research focuses on individual’s social actions, beliefs, thoughts, and perceptions. In the case of this study, data was collected by interacting with teachers in their natural settings in different schools. Denscombe (2003:267) describes qualitative research as an umbrella term that covers a variety of styles of social research. It is a type of research that produces findings arrived at not by means of quantification but rather by way of description.

3.3 THE ROLE OF THE RESEARCHER

It becomes important, at this stage, to explain the role of the researcher so as to convey a clear understanding of what is expected of him/her. Firstly, a researcher should ask for permission to conduct research on identified sites. According to Denscombe (2003:273), the researcher is one of the data gathering instruments in a qualitative study. Indeed, in the current study, it is the researcher who talks to the principals and educators in schools, observes their activities, reads their documents, and records information in the form of field notes or journals.

Walliman (2001:96) characterises the researcher in terms of his or her interest in how the subjects of the research talk about their own experiences. As such, the researcher should possess the necessary research skills that will enable the research process to produce reliable and valid data. Patton (in Du Plessis 2005:154) agrees that validity, in qualitative methods, hinges, to a significant extent, on the skills and competence of the person doing the field work.

It is the duty of the qualitative researcher to establish good relationships with the participants, so that they feel free to communicate their experiences. In this regard, Goddard and Melville (2001:49) underscore the fact that the researcher must remember that the subjects are individual human beings and should treat them with appropriate respect. The qualitative researcher must strive to build a relationship based on reciprocal trust and good rapport with his/her subjects. The quality of the data depends on this rapport insofar as it increases the likelihood of participants sharing authentic knowledge relating to their life

world. Thus, according to Walliman (2001:241), the researcher should avoid leading questions, excessive guidance, and other factors which may cause the distortion of information. Therefore, the researcher should collaborate with the participants in a professional manner in order to acquire the required information.

Hoberg (1999:83) characterises the researcher as a curious learner who comes to learn from and with participating teachers. Thus, the researcher did not go to the field as an expert or a figure of authority. However, the present researcher was confident and interacted actively with the participating teachers in different ways, to solicit information about how teachers make sense and respond to the curriculum policy. The researcher developed an interview guide that facilitated the discussions she had with the participants. McMillan and Schumacher (1997:447) stress the need for the interview guide topics to be selected ahead of time; but indicate that the researcher is at liberty to decide on the sequence and wording of the questions during the interview.

3.4 RESEARCH APPROACH

Qualitative research requires a plan for choosing both the data collection sites and the participants. As a matter of fact, qualitative researchers investigate small, distinct groups such as all the participants in an innovative school, all the students in a selected classroom, and a principal's role during an academic year (McMillan & Schumacher 1997:132). Some researchers select multiple sites that comprise subsets of larger groups.

It must be emphasised that the current study is a case study of teachers who implement environmental education as a cross-curricula component in the Natural Science learning area. For the purpose of this study, a multiple-case study design was applied. The investigation focused on Grade 9 Natural Science teachers of the General Education and Training band of the sampled schools located in the Capricorn District of the Limpopo Department of Education. The main reason for using a case study approach is that it provides the researcher with the opportunity to discover the important questions that need to be asked as she learns and observes participants in practice for a prolonged period. A case study approach helps educational researchers to continually stimulate new ideas (McMillan & Schumacher 1997:132).

The researcher's selection of a case study approach in this research is because it gave her enough time to learn more about how teachers implement environmental education in a natural setting. Consequently, the researcher was able to gather in-depth information on how social interaction, context, motivational influences, and knowledge influence teachers' sense-making and the ways in which they respond to the teaching of environmental education in the classroom, as required by the curriculum policy. The use of a case study approach also enables the researcher to learn more on what encourages or discourages teachers to respond to the integration of environmental education into their subject and to operate differently.

Even though using a case study for research purposes remains one of the most challenging endeavours in Natural Science – because it is time-consuming in that the researcher has to focus on a small or a distinct group of people in a natural setting for a prolonged period, to study, learn, and gather more in-depth information about the participants or the phenomenon – the case study does not attempt to control events (Anderson 1990:114). Moreover, its ability to deal with a variety of evidence, for instance, documents, artefacts, interviews, and observations, increases its reliability and usefulness in collecting first-hand information. The uniqueness of the case study helped the researcher to gain sufficient information that could not have been gathered through the use of a different research approach. The value of the case study was enhanced by the fact that this study used a multiple-case study approach whereby the researcher spent sufficient time with the teachers responsible for Natural Science in Grade 9. This way, she collected adequate information to answer the research questions. Multiple-case study designs have distinct advantages and disadvantages, in comparison to single case studies. Apart from the need to gather reliable information, the researcher opted for a multiple-case study design because it also enables the generalisation of the results.

The very high probability of gathering reliable first-hand information when using the multiple-case study derives from its ability to deal with a variety of evidence (Yin 2003:243). The ability to generalise the findings is the direct result of the fact that the evidence from multiple cases is considered more compelling, and the overall study is therefore regarded as robust.

3.4.1 Sampling Design and Procedures Applied Prior to the Investigation

Sampling is done to enable the researcher to make the broadest possible generalisations applicable to large classes of events. Researchers often want to know something about specific populations that – due to their size, time, cost or inaccessibility – cannot be studied in their entirety (Punch 2009:162). This is because, even if it were theoretically possible to identify, contact, and study the entire relevant population, the above-mentioned factors usually make it an impossible undertaking. As such, the use of samples may result in more accurate information than that which might have been obtained if a researcher had studied the entire population. This is because, with a sample, time, money, and effort can be managed to produce better quality research based on in-depth information (Punch 2009:162). In other words, the observation or study of a phenomenon in its entirety would be tedious and time-consuming and would produce a massive amount of data which would be difficult to process, analyse, and interpret. For these reasons, this researcher chose to conduct her study by means of a smaller sample drawn from a population of schools with educators who teach Natural Science to Grade 9 classes.

Punch (2009:162) notes the existence of different types of sampling that can be used by researchers. The two major groups of existing sampling procedures are probability sampling and non-probability sampling. Probability sampling is based on randomisation, in that each individual in the population has the same known probability of being selected. The best-known kinds of probability sampling are simple random sampling, systematic sampling, stratified random sampling, cluster sampling, and panel sampling. Non-probability sampling is not based on randomisation. The types of non-probability sampling are accidental, purposive, quota, dimensional, target, snowball, and spatial sampling. For the purposes of this study, a snowball sampling was used to identify suitable schools from the Capricorn District of the Limpopo Province to constitute the sample.

3.4.2 Justifying the Selection of the Sample Design

In purposeful sampling, which is sometimes called purposive or judgmental sampling, the researcher selects particular elements from the population that will be representative of the target group or informative about the topic of interest. Based on the researcher's knowledge of the population, a decision is made about which subjects should be selected in order to

collect the best information that would enable the researcher to achieve the purpose of the study (McMillan & Schumacher 1997:324). Nonetheless, this kind of sampling has some limitations, in that the researcher makes generalisations that have the potential to be biased, compared to the probability design. Purposeful sampling allows researchers to increase the utility of the information obtained from small samples. The snowball or purposeful sampling enables the researcher to generalise the findings to similar subjects. This saves researchers time, as they solely focus on the selected teachers who are representative of the entire population. In the context of this study, studying the entire population of teachers teaching Natural Science in Grade 9 in South Africa would take a very long time. Thus, snowball sampling became the best way of selecting teachers from the entire population of Grade 9 Natural Science teachers in the Limpopo Province.

Regarding the sampling, the researcher approached the environmental section in the Limpopo Department of Economic Development, Environment and Tourism in the Capricorn District – which provides environment-related training, programmes, and other activities at schools. The objective of this visit was to ask for advice and request the names of schools with which they had been involved. The ultimate objective was to identify and gather information on school teachers in the district who had been trained on how to implement environmental learning as a cross-curricular component in the curriculum for the General Education and Training band. As a result, I had a total of three different schools with teachers implementing environmental learning as a cross-curricula component within the General Education and Training band in their Grade 9 classrooms. These three schools formed the basis of the multiple-case approach to my research. Put another way, it is in these three schools that first-hand, in-depth information was gathered from the teachers responsible for teaching Natural Science to Grade 9 learners.

3.4.3 The Population from which the Sample was drawn

According to McMillan and Schumacher (1997:164), the term population refers to the entire group of people, things, or events that share one common trait. For the purpose of this study, the population included all the Grade 9 Natural Science teachers from the Capricorn District of the Limpopo Province, South Africa. The schools situated in the Capricorn District were selected for a number of reasons. The first reason is that they are located in the vicinity of the researcher. The second reason is the fact that they have Grade 9 Natural Science streams.

The third motivation is that teachers from these schools have received training in the form of workshops on the implementation of the Revised National Curriculum Statement that forms the basis for this study, since teaching and learning in the classroom is guided by this curriculum policy.

3.5 DATA COLLECTION

In cognitive research, the choice of instruments is related to both the purpose of the study and the structure of the design. The primary instrument for qualitative methods is the researcher. However, he/she may use other research instruments to collect qualitative data in order to validate and clarify present data (Mrazek & Cantrell 1999:49).

Qualitative data collection techniques were used in this research because they enabled the researcher to gain a deep understanding of the phenomenon of interest. The use of qualitative data collection instruments was also helpful in establishing the perceptions and views of the participants concerning the implementation of environmental education as a cross-curricula strategy within the Natural Science learning area. It also enabled the researcher to understand how these teachers respond and interpret the policy regarding the implementation of environmental education. The main techniques or instruments of data collection used in this study included interviews, document analysis, and observations. These instruments were used to gather in-depth information from the participants and other sources.

3.5.1 Data Collection Procedure and the Application of Data Collection Tools

An interview protocol was developed with questions based on the three main research questions of the study. The interview protocol was piloted to three Grade 9 Natural Science teachers. The purpose of piloting the interviews was to verify whether the tool would be effective in gathering relevant data that would answer the research questions; to check if teachers would be able to understand and respond to the questions as posed; and also to have an idea of how long the interview would last. After an interview protocol had been developed and tested, three schools were identified from which the data were collected. The researcher applied for permission from the Limpopo Department of Education to collect data from the identified schools. Subsequently, the researcher contacted the principals of the identified schools to make appointments. The first visit to all the schools was basically for

the researcher to introduce herself to the Natural Science teachers so as to explain the purpose of the interview, indicate its length and the provenance of the researcher, justify the choice of the schools where these educators teach, get the teachers' timetables, and arrange times for observations and interviews with these Natural Science teachers.

The researcher started visiting the identified schools, as per the timetable, on different days of the week. Some slots were used for the interviews with the relevant teachers. On the first day, the researcher arrived on time and was introduced to Grade 9 Natural Science learners. During the first meeting with the Natural Science teachers, the researcher encouraged them to feel free to teach in the same way that they usually do on a daily basis and to forget about the researcher's presence. The researcher stressed that they should not try to impress her, because that might give the researcher a different impression of what and how they respond to the new curriculum policy. The researcher clearly indicated to the teachers that the information gained from both the interviews and observations would only be used for academic purposes. She also assured them that their names would not be disclosed, that is, they would remain anonymous. After the first visit, the researcher was then free to visit as per the timetable, and arrived before the class started.

3.5.2 Phases of Data Collection that were Followed Prior to the Final Analysis

The qualitative phases of data collection and data analyses are interactive research processes that occur in overlapping cycles. As indicated earlier, the two happened simultaneously and were followed later by a more detailed analysis of data. The following research phases demonstrate the interactive processes of data collection, recording, analysis, and tentative interpretations (McMillan & Schumacher 1997:104).

3.5.2.1 Phase 1: Planning

The researcher started by analysing the problem statement and the anticipated research questions to focus the data collection efforts. It is at this stage that the researcher described the setting or site, the type of interviewees or documents that were likely to yield information about the problem. This is where the researcher locates and gains permission to use the site, a network of persons, or archived documents (McMillan & Schumacher 1997:443). For the purpose of this study, the researcher applied for permission to collect data in Limpopo, from the Limpopo Department of Education. The permission-granting document stipulated all the

rules to be adhered to and conditions to be satisfied by the researcher. The permission documents obtained from the Limpopo Department of Education, together with the research proposal, were handed over to the participating Grade 9 Natural Science teachers on the first meeting with them.

3.5.2.2 Phase 2: Beginning data collection

This is the stage where appointments were made to meet with teachers at their respective schools. This opportunity was also used to secure permission from the school to collect data. On this day the researcher also made appointments with the different participating schools in order to meet with the Grade 9 Natural Science teachers, introduced herself, and set up dates for both the observations and interviews with the different teachers. This is the stage where the researcher began to negotiate approval for data collection. At this stage the researcher ought to have gained enough confidence to effectively play her role, in that she is no longer new in the environment. The researcher's confidence increases as she continually communicates and makes appointments with teachers telephonically and follows these up with visits to the schools to obtain teachers' timetables, and to acquaint herself with the school environment.

3.5.2.3 Phase 3: Basic data collection

This is the stage where the researcher became more comfortable with his or her role and no longer looks around or listens only. The researcher begins to hear, see, and read what is going on. At this stage, a tentative data analysis begins as the researcher mentally processes many ideas and facts, while collecting data. The researcher then identifies ideas and facts that need corroboration in the closing phase. This stage is very crucial and needs researchers to be alert. This is because one can easily tap out the reality of the situation, without even going into detail, as an obtrusive participant. At this stage again, most differences and similarities on how teachers in different schools interpret the curriculum were observed. The more the researcher went into detail on what seemed to be prevalent in influencing these teachers' sense-making, the more information she gathered on how different situations are explained from different perspectives. All the observations in all three schools were conducted first. They were then followed by the interviews with the Grade 9 teachers, on separate occasions, at their respective schools.

3.5.2.4 Phase 4: Closing data collection

This is the stage where the researcher concludes the last interview or observation. In qualitative research, there is no prior date for the end of data collection as there is in quantitative studies. Ending a qualitative data collection depends on the research problem and the depth and richness of the data collected. The researcher ceased the process after seeing a recurrence of the same information in interviews with different participants. Following the data collection timeframe, she then stopped collecting data. It is important to indicate that when the data collection was stopped, she had accumulated enough data for the study. In qualitative research, it is vital to set up a timeframe to guide one's collection of data and a conclusion date; otherwise, the data collection process can take longer than it should.

3.5.2.5 Phase 5: Completion

This is the most important and crucial stage. This phase is informed by the initial phase of the process. The researcher completed the whole process by blending it into a more detailed data analysis that was followed by the construction of meaningful ways to present the data. The researcher listened to the recorded data and asked a number of questions as she slowly induced conceptual themes and possible interpretations. Data collection was scheduled for three months from September 2013 to April 2014. Data collection was completed after all the identified Grade 9 Natural Science lessons were observed for the specified period, and the Grade 9 Natural Science teachers had been interviewed. As mentioned previously in Chapter 3, data collection was conducted simultaneously with data analysis. This was then followed by a more detailed data analysis, interpretation, and the recommendations that would signal the completion of the entire study.

3.6 THE RATIONALE FOR THE SELECTION OF THE QUALITATIVE DATA COLLECTION TECHNIQUES

According to Johnson and Christensen (2004:178-193), every researcher collects data by using one or more techniques, which are either quantitative or qualitative in nature. However, some techniques are more effective than others when addressing specific types of question or topic.

Straus and Corbin (1998:177) indicate that many quantitative researchers are quick to dismiss qualitative studies as giving no valid findings. They assert that qualitative studies

ignore representative sampling, with their findings based only on a single case or a few cases. Equally obdurate are some qualitative researchers who firmly reject statistical and other quantitative methods, arguing that such strategies yield shallow or completely misleading information. In this study, the researcher focused on collecting data that would be representative of teachers' interpretation of the curriculum policy on issues related to the implementation of environmental education in the curriculum, with a specific focus on Grade 9 Natural Science teachers. As a result, a qualitative research method was selected as an approach to help in better understanding what and how teachers respond to curriculum policy. In the light of this, the following data collection tools were employed in gathering information about the topic.

3.6.1 Document Analysis

Documentation refers to “paper” data which includes public documents such as policy documents, empirical research, minutes of meetings, official reports and private Internet documents that were used during the process of data collection. Both public and private documents were used in this study to obtain additional information on the implementation of environmental education across the curriculum. The role of these sources was to verify and clarify data collected through interviews and observations.

It is very difficult to get information from documents. This is because information is sometimes protected in such a way that it is inaccessible to the public. In such cases, the researcher may have to obtain the information from hard-to-find places. However, if such information can be found, it enables the researcher to obtain the language and words of the participants. The researcher employed document analysis as a data collection tool in order to get additional data that was needed to answer the research questions. One of the advantages of analysing documents is that it provides data that are thoughtful and that can be accessed at any time convenient to the researcher (Creswell 2003:23).

All the documents used and cited in this study were acknowledged and a reference list was compiled. Special attention was given to documents about the implementation of curriculum policy. The key objective in probing the implementation process is to understand the under-explored dimension of how teachers interpret and respond to curriculum policy that challenges their traditional ways of teaching environmental education in the curriculum,

rather than simply exploring the interplay between policy and practice. Data from empirical research studies were used in developing an understanding of how other researchers view the implementation of environmental education in the classroom.

A cognitive framework was used in this study because it assists in stressing the need to consider and delineate teachers' sense-making of the curriculum policy. Moreover, cognitive frameworks help in articulating how teachers construct their understanding of the policy message and interpret their own practices as a result (Spillane et al. 2002:387-421). According to the cognitive framework, three stages characterise sense-making during the implementation process. The views of other scholars and academics on, and their understanding of, what influences teachers' response to curriculum policy helped the researcher to establish what to observe, what to probe, and how to ask the questions so as to obtain more information to support what she had gathered from the literature review.

3.6.2 Observations

Observations were one of the data collection tools that provided an in-depth understanding of what is being investigated. The purpose of observation is to give the researcher direct, first-hand experience of the phenomena under study. Employing observation as one of the data collection instruments gave the researcher time to observe teachers teaching Natural Science in the classroom over a period of time, and to see how they implement environmental education within the learning area. The focus was on recording the constructed realities as demonstrated by the participants. The one advantage of using participant observation is that it is unstructured in the sense that almost anything may be significant. However, the researcher does not record everything that occurs. Observation gave the researcher enough time to observe and pick up other things that influence teachers' sense-making of the curriculum policy. This continued for the three-month period spent in the schools observing Grade 9 Natural Science teaching and learning. The aim of the observations was to examine how Grade 9 teachers integrate environmental education in their respective learning areas, and to watch learner involvement during lessons, classroom set-up, and the types of teaching and learning strategies used in the classroom. Following the timetable received, all the schools were visited for both observations and interviews, on different occasions. Field notes were made on all these occasions, during and after the lessons, followed by data analysis.

Detailed descriptive field notes were recorded and, in the process of data analysis, were organised into meaningful themes, ideas, and other findings, in accordance with McMillan and Schumacher (1997:506). Since this research is a case study of Grade 9 teachers based in three schools, the researcher observed lessons taught by Natural Science teachers responsible for Grade 9 in the General Education and Training band. In each observation, she specifically looked at how the teachers integrated and addressed environmental issues within their Natural Science teaching, the learner involvement, classroom set-up, and the kinds of teaching strategies used in the classroom. In order to capture enough data or information the researcher made field notes. Later, the recorded data was analysed. The researcher also observed and interviewed all the teachers responsible for the Natural Science learning area in Grade 9 in each of the three schools.

The entire process of data collection lasted for a term, which is equivalent to three months. Since this research is a case study, the researcher scheduled regular classroom visits to learn about and observe teachers in practice. Observations were done four times every month. The researcher chose to conduct her observations this way in order to better understand how Grade 9 Natural Science teachers implement environmental education in the different topics that they had to cover, as per timetable. This also gave the researcher enough time to analyse both the recorded data and field notes of each and every observation. These observations were followed by interviews to validate what had been observed during the lessons.

3.6.3 Interviews

An interview could be described as any conversation in which the roles of the interviewer and respondents continually change (Cohen et al. 2000: 67). It presents the researcher with a direct opportunity to obtain reliable and valid information. The purpose of an interview is to enable the researcher to gather descriptive data in the interviewee's own words and to access unobservable information. A researcher can conduct interviews face-to-face, by telephone, or by means of focus groups comprising between six to eight interviewees. In this research, individual interviews were used to gather in-depth information from Grade 9 Natural Science teachers.

The use of interviews as a data collection tool offered the researcher an opportunity to obtain reliable and valid information (Creswell 2003:20). The interviews conducted for this study

were both semi-structured and unstructured. One of the advantages of using both semi-structured and unstructured interviews is their combined ability to elicit views and opinions from the participants (Creswell 2003:20). In this study, face-to-face interviews were done in order to have enough time to talk to teachers and explore how social interaction, context, experience, beliefs, and expertise influence the ways in which they make sense of policy.

Through the use of interviews, the researcher was able to gather more in-depth information on how and what influences teachers sense-making of policy from their own perspectives. Punch (2009:148) points out that “in interviews you discover people’s current thoughts, ideas and attitudes”. This will be helpful in discovering participants’ current perceptions and views regarding the implementation of environmental education in the classroom, in the Natural Sciences learning area of the General Education and Training band. Interviews enabled the researcher to learn and discover more information about how and what influences teachers’ interpretation of the curriculum policy, and what accounts for their differing responses to the curriculum policy.

3.7 THE RATIONALE FOR CONDUCTING THE EMPIRICAL INVESTIGATION

The empirical nature of this study dictated the use of interviews as a data collection technique. An interview instrument was designed to enable participants to respond to the questions in a descriptive manner. This kind of data collection technique was used because it gives the researcher an opportunity to interact with the participants, that is, the Grade 9 Natural Science teachers from the three schools selected. Furthermore, it helped the researcher to extract more information about the relevant teachers’ interpretation of the environmental education policy. Punch (2009:149) remarks that interviewing is probably the most widely used method of data collection in educational research. This is partly because interviews can be conducted on all subjects, by all types of interviewers. Interviews can be informal incidental sources of data or primary sources of information used in a study.

Interviews are highly purposeful tasks, which are more than mere conversations. They represent a specialised form of communication between the interviewer and the interviewees on a given subject matter. Interviews were used because they constitute incomparably rich sources of data. The fact that interviews offer opportunities for the researcher to interact with

participants is one of their advantages. Another advantage of interviews is that they allow both the researcher and the interviewees the opportunity to sit down and discuss issues of interest in such a way that questions or answers can be repeated for more clarity. This is impossible when using a questionnaire which requires the researcher to make an appointment for questionnaire distribution, then to call the respondents to check if they are done so that the completed questionnaire may be collected.

Unlike questionnaires, interviews generally guarantee participants' engagement with all the questions, even if some of their responses may be irrelevant. In such cases, the researcher was able to clarify the questions and put the teachers at ease who felt uncomfortable when responding to some of them. These clarifications and follow-ups also offered the researcher an opportunity to probe more deeply to get in-depth information. Interviews, together with lesson observations, gave the researcher enough time to learn more about issues pertaining to environmental learning in the classroom, and to discover more about why teachers respond to the new curriculum policy in different ways.

These methods of data collection, observations and interviews with different teachers from different schools, enabled the researcher to detect non-verbal cues that would not have been possible if she had used different data collection methods. With interviews, the researcher was able to see changes in facial expressions and changes in voice tones. This was especially evident when dealing with issues related to situated cognition, which is where teachers' sense-making of the curriculum policy is more influenced by their context or school. Issues relating to policy also triggered facial expressions that were different from those observed when engaging teachers on how their knowledge, beliefs, and experiences influence their understanding of the curriculum.

Although interviews have advantages, they also have a few disadvantages. Punch (2009:149) notes that it is often difficult to record participants' responses, particularly when the interview is conducted by the researcher who is also responsible for writing down the participants' responses. Interviews are also challenging because the researcher may be asking one question after another without getting a chance to take notes of the interviewees' or teachers' response to the questions. On the other hand, taking notes during the process gives the interviewer a chance to pause before going to the next question. However, one needs to be time conscious as the interviews with the teachers – which happen after school hours –

should not take up too much of their time. Furthermore, the timeframe also plays a vital role when conducting interviews. Some teachers do not feel at ease when interviewed after a few months of training; whereas others think it is convenient for them to be interviewed and observed as soon as they start with the implementation process so that they can establish whether what they are doing is right, or if they need more training on certain issues. Nevertheless, interviewing and observing teachers with different experience were an advantage for the researcher.

At the participating schools, it was an appropriate time to interview these teachers since they had just started with the formal implementation of the new curriculum policy. As they were doing new things, they also had meetings with colleagues from other schools to examine and discuss the issues they found challenging. During the data collection period, they welcomed the researcher and gave her the opportunity not only to observe their Natural Science lessons, but also to interact with them.

3.8 VALIDITY AND RELIABILITY OF DATA COLLECTED

McMillan and Schumacher (1997: 178) argue that in a case study, data should be collected over a time span that is sufficient to ensure accuracy, and should be collected through the use of more than one instrument. This is to ensure that all data collected are consistent with the events investigated in the research. To review data for accuracy might even call for two or more participants to gather information simultaneously. In other situations, researchers collect data using more than one collection strategy. Hence this study relied on interviews and observations as well as document analysis to gather information to respond to the research questions. In analysing the data, the researcher followed Giorgi's (2009) phenomenological steps of data analysis in which data analysis begins while the interviews are still underway.

Punch (2009:244) reinforces the need to ensure that the data collected are both valid and reliable. He stresses that data gathered through interviews and observations have the highest potential for ensuring validity and reliability, if conducted appropriately. This is true in that data collected through one data collection tool validated data collected through a different tool with the same participants. In the case of this study data collected through observations were validated by interviews conducted with the same teachers who had been observed. Both

the primary and secondary sources of data were consulted and reviewed, as part of data collection. These documents, primary and secondary sources, were used to validate data collected through both interviews and observations.

3.9 CONCLUDING REMARKS

This chapter focused on research methodology. It explained how the research was conducted. The chapter justified the use of the qualitative approach in this study; it also described the methods of data collection used and the research design. The next chapter focuses on the interpretation and analysis of the data emerging from interviews and document analysis. The chapter further provides the findings of the study.

CHAPTER 4 : DATA COLLECTION AND ANALYSIS

4.1 INTRODUCTION

In Chapters 1 and 2, the main critical research questions were posed and an extensive literature review was conducted to provide background on the status of environmental education and curriculum policy. Chapter 3 elaborated on the choice of the cognitive framework that explains teachers' sense-making of the implementation process. It suffices to reiterate that this study is located in the field of educational policy implementation, and that its overall aim is to understand how Natural Science teachers implement the curriculum policy on environmental education within the Natural Science learning area. This study is limited to Grade 9 teachers in the General Education and Training band of the South African education system. To gather more information on the broader research question, during data collection on the implementation of environmental education in school within the Natural Science subject in the General Education and Training band, the following research questions were explored:

Research Question 1: What policies stipulate the provision of environmental education in South African schools in the General Education and Training band?

Research Question 2: How do Natural Science teachers understand and respond to the policy regarding the implementation of environmental education in the classroom?

Research Question 3: What influences Natural Science teachers' understanding of curriculum policy implementation?

In this chapter, the data collection tools or techniques that were used during the empirical investigation and the procedure followed are explained. Issues related to the implementation of environmental education as a cross-curricula component within the Natural Science and which are central to the research are explored. The objective of this exploration is to develop an understanding of what influences teachers' sense-making of the curriculum, so as to make recommendations that will assist in addressing those influences to ensure successful policy implementation in schools.

In order to get in-depth information on what influences teachers' interpretation of and response to curriculum policy implementation, Grade 9 Natural Science teachers were sampled from a population of public secondary schools in the Capricorn District of the Limpopo Province. Maree (2008:79) characterises sampling as the process used to select a portion of the population for study. Qualitative research is generally based on non-probability and purposive sampling, rather than probability or random sampling approaches. He further indicates that purposive sampling simply means that participants are selected because of some defining characteristic that makes them suitable for the explicit purpose of obtaining the richest possible information to answer the research questions.

In the case of this study, the Capricorn District of the Limpopo Province was selected for its proximity and accessibility to the researcher. Grade 9 Natural Science teachers were sampled from three schools in the district, for the purpose of representation in the study. The choice of Natural Science is motivated by the fact that this subject promotes scientific literacy by focusing on the development and application of scientific knowledge and understanding. It also does so by an appreciation of the relationship and shared responsibilities between science and society on issues pertaining to the environment (DoE 2002:104).

The selection of the sampled schools aimed at ensuring a workable size for data collection. This workable sample size provides enough scope to collect rich data that would otherwise not have been easily collected. Sampling in qualitative research is flexible and often continues until no new themes emerge from the data collection process; this is called data saturation (Maree 2008:79). For the purposes of this study, stratified purposive sampling was used. This means that the participants were selected according to preselected criteria that were relevant to a particular research question. The sample, in the case of this study, comprised Grade 9 teachers who teach Natural Science in the Capricorn District of the Limpopo Province. Due to time constraints, the study only involved five educators from the three secondary schools in the Capricorn District of the Limpopo Province.

During the process of data collection, the researcher remained the main data collection instrument. For the purposes of credibility and trustworthiness, the researcher used interviews and classroom observations to gather information from the sampled teachers. The data collected through the use of the above-mentioned instruments were validated by means of official, documented information from the Department of Education.

Maree (2008:80) emphasises the importance of the reliability of research instruments and the validity of the data collected in quantitative research, where the researcher is also regarded as a data gathering instrument. When qualitative researchers speak of research “validity and reliability”, they are actually referring to the credibility and trustworthiness of the research. Lincoln and Guba (1985:316) contend that “since there can be no validity without reliability, a demonstration of the former (validity) is sufficient to establish the latter (reliability)”. Thus, to ensure the validity of its findings, this study adopted a multiple-methods approach to data collection by combining interviews, observations, and document analyses.

All these data collection techniques were used to enhance the trustworthiness of the findings, and for the purposes of crystallisation. The latter, in most qualitative research studies, implies research that seeks to gain a deeper understanding of a phenomenon, instead of causal relationships. Maree (2008:81) notes that crystallisation emerges from the use of various data gathering and data analysis techniques, and represents the researcher’s own reinterpreted understanding of the phenomenon. As such, what is presented as the findings of the study is the understanding that crystallises from the data.

4.2 DATA COLLECTION PROCESS

This section describes the procedure followed in collecting data. It also explains, in detail, how the data collection techniques were applied in this study.

An interview protocol was developed. After the development and testing of an interview instrument, schools from which the data was going to be collected were identified in the Capricorn District of the Limpopo Province. Interview testing was done to establish whether the instrument would be effective in gathering relevant data and to determine the time that it would take to complete each interview. Teachers were identified from the different schools in the district to pilot the instrument. All the identified teachers had a similar understanding of the questions and were able to respond to them without any problems. None of the teachers showed any sign of being uncomfortable when responding to the interview questions. This phase was then followed by the actual data collection processes and stages. The researcher contacted the principals of the relevant schools to make appointments, and

wrote a letter to request permission from the Limpopo Department of Education to collect data from the identified schools situated in the Capricorn District.

The researcher started visiting the identified schools, according to the timetable, on different days of the week. Some slots were used for interviews with the teachers, whereas others were devoted to lesson observations. On the first day, the researcher arrived on time and was introduced to the Grade 9 Natural Sciences teachers and their classes. The researcher encouraged them to feel free and teach the same way they usually do, that is to forget about the presence of the researcher and avoid trying to impress her. This was to prevent giving the researcher a skewed view of how they respond to the new curriculum policy. Indeed, when teachers display their normal behaviour, the researcher is able to get the correct view of what influences teachers' sense-making of the policy. All the teachers were interviewed individually, and 12 classroom observations were conducted. The researcher clearly indicated to the teachers that both the interviews and observations would only be used for academic purposes, and that their names would not be mentioned as they would be referred to only as "the sample".

However, some challenges were encountered during the process. Some teachers could not fully participate in the study because they were not comfortable with the idea of being interviewed or observed during their lessons. In one school, a teacher indicated that she would rather be interviewed than observed because she was unsure if the way she teaches learners is consistent with how she is expected to teach. Another teacher, in another school, felt that it was better for her to be observed than to be voice-recorded talking about things she is not sure of.

The availability of infrastructure also posed a challenge, particularly the space to conduct interviews with teachers. In some schools, the researcher had to interview teachers in the presence of other teachers, in a classroom converted into a staffroom. In many of these cases, teachers were not free to speak loudly because they did not want to disturb others. Conversely, other schools had sufficient space for the researcher to interview teachers in their own classrooms; hence the interviews were conducted freely.

In schools in urban areas, the classes have no more than 30 learners. In these schools, the learners move from one class to the next; while, in rural area schools, teachers are the ones

who move from one classroom to the next. Consequently, the interviews took place in different environments. Although the challenges faced varied from school to school and between rural and urban schools, the common denominator between all schools was the passionate way in which the teachers responded to the questions about how they interpret and respond to curriculum policy implementation. All the teachers who were interviewed were free to talk and explained how and what influences the way in which they make sense of and respond to the policy. The following section provides a thorough discussion of how the phases of the data collection unfolded.

4.2.1 Phases of Data Collection during the Investigation

The phases of qualitative data collection and analyses are interactive research processes that overlap. This means that these two processes happened at the same time, even though a more detailed analysis of data was subsequently done. The following research phases illustrate the interactive processes of data collection, recording, analysis, and preliminary interpretations during the data collection period (McMillan & Schumacher 1997:104).

4.2.1.1 Phase 1: Planning

The researcher began by analysing the problem statement and the guiding research questions, which focused the data collection efforts. This is the stage at which the researcher described the site, and decided on the type of interviewee or documents that would generate information about the topic. Subsequently, the researcher applied for permission to collect data from the relevant schools by approaching the Limpopo Department of Education. The permission was granted; the issued document stipulated all the rules to be adhered to and conditions to be fulfilled by the researcher. The three secondary schools were then identified as the main sites for data collection, with their Grade 9 Natural Science teachers as the subjects.

4.2.1.2 Phase 2: Beginning data collection

It is at this stage that appointments to meet with teachers at their schools were made. The researcher had to ask for permission from the school to collect data. Consequently, she made appointments with the different school principals to meet with the Grade 9 Natural Science teachers. Once the request was granted by the school principals, the introductions and scheduling of both observations and interviews with the selected teachers were done.

The first visit to all the schools gave the researcher the opportunity to introduce herself to the Grade 9 Natural Science teachers and to explain to them the purpose of the interviews, how long they would be, who the researcher was, where she comes from, and why these teachers' schools had been selected. The researcher also used this opportunity to get the involved teachers' timetables and to schedule observations and interviews with the Grade 9 Natural Science teachers in all the sampled schools. It was at this stage that teachers were encouraged to maintain their usual teaching style. On this same day, the researcher was shown where the Grade 9 Natural Science classes were held.

4.2.1.3 Phase 3: Basic data collection

After the introductory visit, the researcher was more comfortable in the different school environments. This enabled her to pay attention to what was going on in each school. At this stage, a tentative data analysis began as the researcher mentally processed many ideas and facts, while collecting data. The researcher then identified ideas and facts that needed corroboration in the closing phase. As an obtrusive participant, the researcher was very conscious of the need to quickly get a broad picture of the situation. Differences and similarities on how the teachers in different schools interpret the curriculum were soon observed. The more the researcher went into detail and gathered more information on what seemed to be prevalent in influencing teachers' sense-making, the more information on how different situations are explained from different perspectives emerged. As mentioned earlier, data collection was based on observations and interviews with Grade 9 Natural Science teachers from three different secondary schools that fall under the Department of Education in Limpopo, Capricorn District. All the lesson observations in all the schools were conducted before the interviews with the Grade 9 Natural Science teachers which were conducted individually on separate occasions.

4.2.1.4 Phase 4: Closing data collection

This is the stage at which the researcher concluded the interviews and observations. It must be noted that, in qualitative research, there is no predetermined date for the end of data collection, as is the case in quantitative studies. Ending qualitative data collection depends on the depth and richness of the information gathered. That is, the researcher stopped the data collection process after realising that the same information was recurring in the interviews with the different teachers.

Data collection lasted three months, between September 2013 and April 2014. The process of data collection was completed after all the selected Grade 9 Natural Science lessons had been observed for a specified period of three months and the Grade 9 Natural Science teachers in the sampled schools had been interviewed. In qualitative research, it is vital to set up a timeframe to guide the collection of data; otherwise, the process will take longer than it should.

4.2.1.5 Phase 5: Completion

This is the most crucial stage and is informed by the previous phases of the process. The researcher completed the whole process by doing a more detailed analysis of the data collected. This was followed by the construction of meaningful ways to present the data. As indicated in Chapter 3, data collection was conducted simultaneously with data analysis. This was followed by a more detailed analysis of the data, an interpretation, and recommendations that led to the completion of the study. The researcher listened to the recorded data and asked a number of questions and, slowly, she induced conceptual themes and possible interpretations. The researcher then read the transcribed interviews of the different teachers to understand and identify themes which emerged from the different interview transcriptions. Themes that recurred in interviews with different teachers were coded with the same colour and those which differed were also coded differently. All the themes which emerged from the transcriptions were then categorised according to the cognitive framework of the study. Finally, these themes were discussed in detail.

4.3 RATIONALE

Every researcher collects data by means of one or more qualitative or quantitative techniques. It needs to be noted that some techniques are more effective than others when addressing specific types of questions or topics (Johnson & Christensen 2004:178-193). Qualitative data collection techniques were used in this study so as to gather in-depth information on how teachers interpret and respond to curriculum policy implementation.

Straus and Corbin (1998:177) observe that many quantitative researchers dismiss qualitative studies, arguing that they do not generate valid findings. They assert that qualitative research ignores representative sampling, and that such findings are only based on a single or a few

cases. Equally obstinate are some qualitative researchers who firmly reject statistical and other quantitative methods, arguing that such strategies yield shallow or completely misleading information. In this study, the researcher focused on collecting data that would be representative of teachers' sense-making of the curriculum policy and on their implementation of environmental education in the curriculum, with a specific focus on Grade 9 Natural Science teachers. Consequently, a qualitative research approach was selected to get a better understanding of how teachers make sense of the curriculum policy. The following research techniques were applied in collecting data to answer the research questions.

4.3.1 Observations

Observation is a systematic process of recording the behavioural patterns of participants and occurrences without necessarily questioning or communicating with them. Observation is an essential data gathering technique, as it has the potential of providing researchers with an insider perspective on behaviours in different settings. As such, it helped the researcher understand the social and situational dynamics that influence the ways in which Natural Science teachers respond to the curriculum policy (Maree 2008:84).

Observations provided an opportunity for the researcher to build relationships with the participants in their own school settings. This enabled the researcher to employ other data collection techniques with greater ease. Observations were used to gather first-hand experience; they gave the researcher the opportunity to see and read up about what factors influence teachers' interpretation of the curriculum policy. The observation of Grade 9 Natural Science teachers from the sampled schools continued for a period of three months, with the aim of determining how these teachers integrate environmental education in the Natural Science subject, to see how they involve the learners during the lesson, to see the classroom set-up, and also observe the types of teaching and learning strategies used. Following the timetable received from all the schools, the sampled schools were visited to conduct both observations and interviews, on different occasions. Field notes were made on all the occasions, during and after the lessons and a detailed analysis of the data was undertaken. Teachers were observed while teaching in the classroom, and then interviews with the same teachers followed. One interview was conducted with each of the five Grade 9 Natural Science teachers. The data collected through these observations are presented in Table 4.1 below. The presentation focused specifically on what was observed; this includes

classroom-set up, the use of available resources, teaching strategy or methods and also learner involvement during the lessons.

Table 4.1: Summary of data collected through observations

DATE AND TOPICS		NUMBER OF LEARNERS IN A CLASS-ROOM	WHAT WAS OBSERVED		
Date	Topic		Classroom set-up and use of resources	Teaching Strategy	Learner involvement
TEACHER 1					
September 2013	Reproductive System	Teacher 1 + 50-58 Grade 9 learners	<ul style="list-style-type: none">• Learners were arranged well. Sit in twos at each desk• Learners share textbook• Classroom well ventilated with some posters on the wall• Not enough resources or space for the teacher's movements	<ul style="list-style-type: none">• Question and answer• Chalk and chalkboard methods• Also makes use of mother language	<ul style="list-style-type: none">• Limited participation and only answer questions raised• Learners take notes during the lesson
April 2014	Substance and Mixtures				
TEACHER 2					
September 2013	Climate, Season	Teacher 2 + 28-30 Grade 9 learners	<ul style="list-style-type: none">• Very spacious• Posters on different concepts• Teacher's office• Enough resources for experiments	<ul style="list-style-type: none">• Chalk and chalkboard• Question and answer• Group discussion and presentation	<ul style="list-style-type: none">• Learners sit and listen• Ask questions for clarity• Work in groups• Very active and more independent
September 2013	Weather				
February 2014	Circulatory Systems				
April 2014	Balancing Equation				
TEACHER 3					
September 2013	Climate and Weather	Teacher 3 + 26-30 Grade 9 learners	<ul style="list-style-type: none">• Very spacious• Posters on different concepts• Teacher's office• Enough resources for experiments	<ul style="list-style-type: none">• Chalk and board• Presentation• Textbook• Classwork and assignment or project• Makes use of extra notes	<ul style="list-style-type: none">• Learners are very actively involved• Present subtopics of the main topic in groups• Ask questions for clarity
February 2014	Circulatory System				
February 2014	Biodiversity				
April 2014	Balancing Equation				
TEACHER 4		Teacher 4	No Observation		
TEACHER 5					
February 2014	Excretory System	Teacher 5 + 42-55 Grade 9 learners	<ul style="list-style-type: none">• Not enough space and resources• Well ventilated• Few posters• Learners share textbooks• Learners sit in twos	<ul style="list-style-type: none">• Chalk and board• Textbook• Question and answer• Uses mother language to explain further	<ul style="list-style-type: none">• Limited learner involvement• Take notes during the lesson• Complete classwork and exchange books with each other for marking
April 2014	Pure Substance and Mixtures				

Note: Table 4.1 provides a summary of the researcher's description of what she observed and the reflection of what happened during the lesson observations with regard to teachers' implementation of curriculum policy. This provides a basis for teachers' varying understanding and implementation of environmental concepts within the Natural Science learning area.

4.3.2 Interviews

Interviewing is one of the main data collection tools in qualitative research. It is a very good way of accessing people's perceptions, meanings, definitions of situations, and constructions of reality. Interviewing remains one of the most powerful ways of understanding others. The aim of qualitative interviews is to see the world through the eyes of the participants, who can be a valuable source of information, provided that the interviews are used correctly (Maree, 2008:87). In the context of this study, interviews are construed as two-way conversations consisting of the researcher asking particular questions in order to collect data and to learn about the ideas, beliefs, views, opinions, and behaviours of the participants. Interviews offered the researcher an opportunity to obtain reliable and valid information. The interview schedule involved semi-structured and unstructured interviews which were aimed at eliciting the views and perspectives of the relevant educators.

The advantage of face-to-face interviews is that they gave the researcher the opportunity to talk to the teachers and explore how social interaction, context, experience, and expertise influence the way they make sense of policy. Through the use of interviews the researcher was able to gather more in-depth information on how and what influences teachers' interpretation of the policy, from their own perspectives. Trochim (2001:103) stresses that interviews enable the researcher to discover peoples' current thoughts, ideas, and attitudes. This type of data collection gave the researcher the opportunity to learn and discover more about how and what influences teachers' interpretation of and peculiar responses to curriculum policy.

In order to make sense of the data collected through interviews, they were transcribed and analysed in accordance with Giorgi's (2009) phenomenological steps.

All the interviews with the different teachers were recorded. The researcher then read the interview transcripts for a better understanding and to establish whether there was a need for her to gather more information from the teachers before she finalised the data collection phase and moved to the next step. The last step of the data collection through interviews was typing up the recorded audio data. This assisted the researcher to reach an in-depth understanding of the teachers' interpretation of and response to curriculum policy implementation. Transcription constituted a transition to the first step of data analysis, which is reading for understanding. This is meant to eliminate redundant information, and make sense of the data. Subsequently, the researcher coded similar themes which emerged from the interviews with different teachers. This enabled the researcher to arrange the data into categories in preparation for the detailed discussion.

At this stage, Giorgi (2009) advises the researcher to rewrite the interviews from first person to third person, before the data analysis, as this enables the researcher to focus better on the study. In other words, this change in narrative voice helps the researcher to focus more on the subject phenomenon. Following Giorgi's (2009) phenomenological steps of data transcription and analysis assisted the researcher to make sense of the data.

4.3.3 Document Analysis

Document analysis, as a data gathering technique, focuses on all types of written communication that may shed light on the phenomenon that is being investigated (Maree 2008:82). The term document may include published and unpublished materials. Examples of public documents are policy documents, empirical research, minutes of meetings, and official reports; whereas examples of private documents include Internet information (emails). The advantage of analysing documents is that it generates insightful data that are conveniently accessible to the researcher, at any point in time.

In this study, content analysis was used as a systematic approach to qualitative data analysis, in that it identified and summarised the message content. Content analysis was applied to policy documents and official reports which included annual reports, quarterly reports, and annual performance plans of the Department of Education in the Limpopo Province. Content analysis was used to establish similarities and differences in text that would corroborate or confirm data collected through interviews and observations. In the case of this study, content

analysis confirmed the findings from interviews and observations and provided more information relating to the implementation of curriculum policy on environmental education in the Natural Sciences at Grade 9 level. Content analysis also confirmed that teachers' response to curriculum policy implementation is influenced by different factors, as discussed in the literature review.

Content analysis established that all the schools do not have the same resources or infrastructure and that teachers have different content knowledge and experience. This affects the way in which curriculum policy is received, interpreted, and implemented. Significant attention was given to documents about the implementation of curriculum policy. This is because the key dimension of the implementation process is to understand how teachers respond to the initiative. The focus was on the seldom-explored dimension of how teachers construct their understanding of and respond to a curriculum policy that challenges their habitual ways of teaching environmental education, rather than on the interplay between policy and practice only.

As indicated earlier, content analysis included information from the Limpopo Department of Education's annual report, annual performance plan, and quarter reports. The data gathered from these strategic documents are provided in Table 4.2 below. The presentation of the data from document analysis focused on specific programmes in the Department of Education which deal mostly with issues of teacher support and development, curriculum policy implementation, infrastructure, and resources.

Table 4.2: Summary of data collected through document analysis

	APP 2013/14	Quarter Reports 2013/14	Annual Report 2012/13
Programme 2: Public Ordinary Schools <i>Provides public ordinary education from Grade 1 to Grade 12, in accordance with SASA.</i>	Shows that 29 399 teachers in the GET band were targeted for teacher development training in 2013/14 FY.	None of the reports gave evidence on the training of teachers. The training was deferred to 2014/15 FY.	No training was conducted for GET band teachers on teacher development.
	Shows that 2 010 schools will be visited on a quarterly basis. There are 134 circuit offices and 10 district offices.	Quarter reports show disparities, it is only in quarter 4 that the Department of Education reached its target. During the other quarters, there were challenges raised by the department which affected the progress.	Annual target was increased, as compared to 2012/13 FY; and, in 2013/14 FY, 4 116 schools were set to be visited. However, the same challenges that affected progress have been quoted in the quarter reports of 2013/14 FY.
	55 777 educators targeted for	No evidence that educators were employed in the 2013/14	To be done in the next financial year, 2014/15.

	employment in public ordinary schools in 2013/14 FY.	FY.	
	Number of schools visited once per quarter by circuit officials.	Challenges of transport affected school visits and the number of schools.	Not all the schools were visited and an improved strategy is in place to address this challenge.
Programme 8: Infrastructure <i>Provides and maintains infrastructure, facilities for admin and schools.</i>	Shows that 1 448 classrooms in public ordinary were targeted to be built in 2013/14 FY.	Shows that few classrooms were built. Hence, there is overcrowding reported in schools located in rural areas.	More schools were targeted in the new financial year's APP 2014/15 which will cater for both normal streams and special schools.
	Shows that 418 specialist rooms were targeted.	Only few specialist rooms were built in schools; none in any of the schools visited in rural areas.	More schools targeted in the 2014/15 financial year.
	Shows that 26 new schools were targeted.	To date, 3 new schools have been built, which were carried over from 2012/13 FY.	No new schools built, except for those carried over from the previous financial years. Mobile classrooms were used in most schools, and storm damaged schools were given priority.
Programme 9: Auxiliary Services <i>Provides educational institutions with training and support</i>	80 Curriculum Advisors to be provided with professional development.	79 Curriculum Advisors were trained on professional development to support all the public schools.	79 Curriculum Advisors were trained.
	800 educators trained on Life Skills in the classroom.	No evidence in the quarter reports showing that educators were trained on Life Skills in 2012/13 FY.	No teacher training on Life Skills.
	Number of officials trained on conduct, management and administration of assessment.	No evidence showing that training took place as planned.	No training of officials on conduct, management and administration of assessment.

Note: Table 4.1 provides a reflection of the performance of the Department of Education with regard to issues related to curriculum policy implementation. This performance provides the basis for teachers' varied interpretations and implementation of the curriculum policy.

Throughout the process, the researcher was mindful of the overlap between the literature review and the use of documents as a data gathering strategy. However, the researcher frequently referred to the literature review which formed the basis of what is already known on the topic, to describe the past and underscore how the study attempts to fill the gap. In

order to better explain the study, a cognitive framework was applied. The cognitive framework was used because it assists in emphasising the need to take account of and to unpack teachers' sense-making of the curriculum policy. Moreover, cognitive frameworks help in articulating how teachers construct their understanding of the policy message and how they interpret their own practices as a result (Spillane et al. 2002:382-421).

This framework identifies three stages of sense-making during the curriculum implementation process. The way in which many scholars and academics see and understand how and what influence teachers' response to the curriculum policy gave the researcher a clear perspective on what to observe, what and how to ask and motivated the researcher to seek more information to support what had been gathered from the scholars who have increasingly focused their studies on the policy process.

4.4 DATA ANALYSIS AND INTERPRETATION

This section provides an analysis and interpretation of the qualitative data collected by means of the techniques discussed in Chapter 3. It must be noted that qualitative research is multi-method in focus in that it involves a perspective that combines an interpretive and a naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempt to make sense of them, or interpret phenomena in terms of the meanings people assign to them (Creswell 2003:20). Qualitative analysis is interpretive, context-based, and iterative. This means that theories emerge as data is collected. Consequently, the data should be tested, refined, and retested against new information, until explanations are repetitive.

In this study, the basic steps of qualitative data analysis were followed. These are data collection, note-taking, coding, sorting, and writing up. It suffices to note that formal systems for the analysis of qualitative data have been developed in order to help researchers get to the meaning of their data more easily. These systems involve coding techniques for findings and marking the underlying ideas in the data; grouping similar information in categories; and relating different ideas and themes to one another (Rubin & Rubin, 2005:153).

The data collected were extensively interrogated. In the process, themes on the implementation of the curriculum policy on environmental education within Natural

Sciences in schools emerged. During the process of interrogating data, the transcripts of the interviews with the different teachers were read. Similar themes emerging from different teachers' interviews were coded and recoded to arrive at themes which emerged from transcripts. These themes were grouped in preparation for the discussion. The other peculiar themes that emerged from individual teachers' interviews were coded separately.

The following themes, which emerged from the data transcription, will be presented under the different categories of cognitive framework. These are individual cognition, which explains the process of understanding, interpreting and filtering policy messages, and is applied to the themes discussed in section 4.4.1; situated cognition, which is applied to the themes discussed in section 4.4.2, explains how the process of sense-making is influenced by the situational context; and policy signal, which is used for the themes discussed in section 4.4.3, explains how the policy messages influence teachers' interpretation and implementation of the curriculum policy.

4.4.1 The Influence of Individual Cognition on Teachers' Interpretation of and Implementation of the Curriculum Policy

Individual cognition refers to the process of understanding, interpreting and filtering of the policy messages. Put differently, it is the process that the individual goes through in order to internalise and make sense of a given policy. The following section explores how teachers interpret policy messages and how their prior knowledge, beliefs, and experiences influence their construction of new understanding.

4.4.1.1 The process of construction and teachers' interpretation of their own practices

In the process of construction and interpretation of their own practices, teachers relate new information or policy messages to the knowledge they already have. It suffices to observe that this interpretation of new information in the light of prior knowledge is a fundamental principle of cognition. Nevertheless, the gap between policy makers' construction of and policy implementers' interpretation of the curriculum policy impacts on the successful implementation of a curriculum policy. Teachers are expected to put into practice curriculum policy intentions, as prescribed by the policy makers. However, teachers struggle to interpret

curriculum policy messages accordingly, because they are not involved in the formulation of the policy.

Teachers emphasised that, although they are expected to teach environmental education concepts within the Natural Science subject, their interpretation of how they should teach these concepts is not the same. In addition, their local environments do not offer equal opportunities to enhance such learning. Consequently, they resign themselves to teaching those concepts in ways that best suit them; teachers teach the environmental concepts using the same teaching strategies they have been using for some years. Their lesson plans, however, follow the expected procedure of the curriculum policy, but the actual teachings in the classrooms differ from the lesson plan.

Within the conventional perspectives, decision makers use their knowledge to identify the action that implementers should take. In other words, those who decide what should be in the policy are not directly involved in policy implementation. Within the same perspective, there seems to be a separation of knowledge; as a result, action is problematic both conceptually and in practice (Reimers & McGinn 1997:71). In most cases, people who generate knowledge are not the ones who formulate the policy; similarly, the latter are not the ones responsible for policy implementation. This makes it difficult, if not impossible, for implementers to have the same knowledge and understanding of the policy as policy makers. This partly explains why teachers are unable to implement the policy as intended.

Teachers further stressed that, as they construct and interpret the policy, their classroom practices are influenced and challenged by the type of learners they have in the schools. Most of the learners in their schools are social-grant recipients and have to be absent for one day every month to go and get their grant. When they are expected to have completed first-semester work, in most cases, teachers find themselves continuing it in the second semester. The fact that educational policies are changed now and then also influences teachers' construction, understanding, and interpretation of the policy, as they put it into practice. Teachers stated that, since 1994, educational policies have been changed many times, without them being involved in the process until the implementation stage (Transcripts 2 & 3).

4.4.1.2 The influence of a lack of motivation on teachers' understanding of the curriculum policy

Different factors influence teachers' interpretation of and response to curriculum policy implementation. Motivation strongly influences how and why teachers respond to curriculum policy implementation. The findings on teachers' understanding of and response to curriculum policy implementation revealed that teachers implement what is possible and in their own ways which they feel have been working for them because they have yielded the expected results. Consequently, they only embrace the policy intentions for administration purposes. They indicated that, because of the poor support they receive from curriculum advisors with regard to curriculum policy implementation, they have continued to teach in the same ways.

During the interviews, three teachers indicated that the teaching profession was no longer as appealing as it used to be. They attributed this to the fact that the school organisation system is very demanding; yet the support provided to teachers is far too insufficient to enable them to meet the demands of their job. They further indicated that, as it is now, if they were given an opportunity to remake their career choice, they would not want to be teachers (Transcripts 1, 3 & 5). In one of the schools visited, the Grade 9 Natural Science teacher is also the principal of the school. He indicated that it was very difficult for him, because he does not often have the opportunity to meet with the curriculum advisors to share his challenges with them. What makes it more difficult is that when the teachers meet with the curriculum advisors, the latter do not always have answers to all the challenges raised by the teachers. This negatively affects principals' role of supervising the implementation process at schools (Transcript 1). In this regard, Hope (2002:40-44) stresses that successful policy implementation also depends on principals' ability to influence teachers' and non-teaching staff's behaviour.

The study conducted by the Department of Education also found that curriculum advisors do indeed lack sufficient knowledge and skills to offer teachers the necessary support; which demotivates teachers (DoE 2009:154). As a result, teachers resort to implementing the curriculum policy in ways that suit them. This necessitates that curriculum advisors be trained adequately so that they are in a better position to assist and motivate teachers, if curriculum policy implementation is to succeed in schools.

Teachers indicated that the allocation of subjects in schools also played a role in motivating them to respond to curriculum policy implementation. They highlighted the fact that they are often allocated subjects to teach which are different from the ones they studied. Hence, the Department of Education should continue to provide content-knowledge training to teachers (Transcripts 2 & 4). In one of the schools, the teacher indicated that her field of specialisation is Mathematics, but she teaches Natural Science. As a result, she teaches this subject in her own way. This teacher further mentioned that she had never been to any Natural Science training, and that, in that particular school, each teacher works individually; which is a demotivating factor (Transcript 4). Another teacher who is also a school principal stressed the decrease in parental involvement in his school. When parents are invited to come to school for discussions about learners' behaviour or performance, they do not; yet, the policy expects parents to be part of the teaching and learning of their children (Transcript 1). Parents also expect their children to progress to the next grade, regardless of learner performance during the year just as the policy prescribes. Such challenges demotivate teachers in their interpretation of and response to curriculum policy implementation, because there seems to be a gap between the curriculum policy messages and the demands of the school organisation system.

4.4.1.3 The influence of teacher' beliefs and classroom practices on curriculum policy implementation

In the context of this study, teachers' beliefs and classroom practices are cognitive processes which cannot be defined. This is because they consist of tacitly held assumptions and perceptions of teaching and learning in the classroom. They can only be observed during the process of teaching and learning in the classroom (Spillane et al. 2002:382-421).

During the interviews, teachers reflected upon their own classroom practices. In their reflections they articulated that both their beliefs and experiences played a vital role in their implementation of the curriculum policy. They further indicated that beliefs and experiences have an impact on how they currently respond to the curriculum policy. They also mentioned that they respond to new information based on their prior knowledge, beliefs, and what has worked for them. Hence, they implement the curriculum policy on the basis of their beliefs. In this regard, one of the teachers boasted that:

“Teaching profession, it used to be something very interesting, something challenging and something that made you know most of the things. But nowadays, it start to be ... I don’t know what to put it ... it seems heavy to me because maybe I’m getting older, but when I started going to Limpopo University where I started with my Honours degree I realised that this teaching is not bad is just that it needs us to continue furthering our studies and stop studying and say I’m ... because the more you read is the more you feel interested in searching other things. Because if we do not study, we do not learn and we will not be creative” (Transcript 4).

Another teacher from a different school stresses that:

“Aggh, to me you see teaching profession is not like how people fashion it that when you are out of it you just want to make lot of money, is just that I like teaching, I like teaching what I know, but since here I have found myself teaching something that I have passion for” (Transcript 2).

Another success story was shared by a teacher who indicated that:

“In the previous year we got 100% and about 70% bachelors so I think that was the ... because you think that they come here and they will ... and of course it’s the case because there are learners who left their schools in their villages and came here and pass matric well and to our amazement we are asked by their former teachers, what did you do with these ones, sometimes when you go to areas like career institutions you meet them and they ask how come is this learner in Grade 12. So I think ... is the reputation of this school. It is just that it is not drawing enough attention to number of learners to the school. Even if learners are coming from those villages we are still having a low general number of learners” (Transcript 1).

This confirms the argument that beliefs and experience have an influence on teachers’ interpretation of new information or policy. Teachers are influenced by what they believe in and how they have been doing things, when responding to new policies. As Kane, Sandretto and Heath (2002:177-228) remark, beliefs vary in strength and kind; and, over time, they form a system or network. The stronger the belief, the more resistant it becomes to change. Hence, teachers’ prior beliefs and practices present challenges not only because teachers are

not willing to change their approach to the policy, but also because the extent of their understanding “may interfere with their ability to interpret and implement the reform in ways that are consistent with the designers’ intent” (Spillane et al. 2002:392).

In the light of the above, one can argue that any form of training provided to teachers by the Department of Education to introduce them to changes in the curriculum must consider teachers’ beliefs and experiences about classroom practices. If teachers believe that new knowledge or new information will not improve practice, they will use what has worked for them in the past. As Vandeya and Killen (2007:101-115) observe, any effort to change teachers’ pedagogical practice needs to acknowledge their conceptions of successful teaching techniques. The interviewed teachers have been teaching for a very long time. Consequently, any new information that they receive, be it in the form of a policy document or not, will be influenced by what they believe in, as will the implementation thereof.

4.4.2 An Exploration of how Situated Cognition Influences Teachers’ Sense-Making of and Response to Curriculum Policy Implementation

Research on situated cognition recognises that the individual’s sense-making process occurs in a social setting and influences how aspects of a situation impact on what implementing agents notice and how they interpret what they notice (Spillane et al. 2002:387-512). In the context of this study, the focus will be on how the situational context of teachers influences how they interpret and respond to curriculum policy implementation.

4.4.2.1 Teachers’ situational and social interaction during the process of curriculum policy implementation

Teachers’ situational context and social interaction refers to the school environment and the relationships teachers have with each other, as well as with the principal and the local community. These relationships also encourage or discourage teachers’ sense-making of the curriculum policy. Hence, it is imperative to understand the situation or context of the teachers who are the primary implementing agents. This is because their understanding of the new information is also affected by their relationships with other teachers and the school environment within which they operate. Therefore, it becomes crucial to consider how aspects of the school environment influence how teachers interpret educational policy.

The process of understanding and interpreting the curriculum policy on the implementation of environmental education within the Natural Science learning area happens in silos. The different teachers interviewed shared their experiences on how their interpretation of the curriculum policy implementation has been influenced by their particular school context. Teachers' poor social network forces them to work in isolation; their inability to share frustrations associated with the policy implementation process with colleagues remains a critical factor in teachers' interpretation and response to curriculum policy implementation. For instance, in a school where the principal is also a Grade 9 Natural Science teacher, he interprets and responds to the policy in a way that meets the needs of the school. This may be due to the fact that, unlike other schools, his is a poorly resourced village school which does not have enough classrooms; hence classes are overcrowded, and the school has no staff rooms or principal's office.

The influence of the lack of resources on the way teachers from such poorly resourced schools teach in the classroom was evident during the interviews. In most cases the teachers will also make use of the local language to explain some of the concepts for learners so that they understand the topic. Regarding the influence of the lack of resources, one teacher indicated that the policy intentions regarding curriculum policy implementation are not possible in his school environment because of the school's and learners' needs, which leave no space for practical implementation of such (Transcript 1).

4.4.2.2 The availability of resources in schools influences how teachers make sense of and respond to the curriculum policy implementation

The unequal distribution of resources among schools poses challenges that influence how teachers interpret and respond to curriculum policy implementation. The availability of resources, proper infrastructure, textbooks, and other resources influence the ways in which teachers interpret and respond to curriculum policy. Teachers in the different schools continue to respond to and interpret the curriculum policy in different ways. This is because of the availability or unavailability of resources in their respective schools, which either support or discourage the implementation of the curriculum policy. The teachers interviewed in urban schools have their own Grade 9 Natural Science classrooms with utensils for experiments; they have their own demarcated office space inside the classrooms. They can take these utensils to the science laboratory whenever they need them. Conversely, teachers

in the rural schools share a classroom, which functions as a staffroom, with eight or ten others – and they do not have science laboratories for experiments.

To deal with this difference in resource allocation, schools located in the same community, which are separated by a fence, take their learners to the nearest school with a laboratory to conduct experiments, or borrow tools to conduct experiments on their own premises. This suggests that teachers from rural schools share their frustrations with regard to the lack of resources for the conduct of experiments. One teacher indicated that she used to borrow a thermometer from the clinic to conduct experiments with Grade 9 Natural Science learners (Transcript 4).

4.4.2.3 Teachers' understanding and implementation of environmental education within the Natural Science subject.

Environmental education is defined as a process that seeks to develop the necessary knowledge, understanding, values, actions, skills, and commitment to allow people (teachers, learners, and the community as a whole) to proactively secure a healthy and properly functioning sustainable environment. As pointed out in Chapter 2, section 2, environmental education is regarded as one of the ways in which people can respond to the environmental crises that exist both globally and in South Africa (Van Rooyen 2000:21).

The findings of the study revealed that teachers have different understandings of what environmental education is and how the curriculum policy regarding environmental education should be implemented. They further stated that they had never been to any training on the implementation of the environmental education curriculum policy, but indicated that they were aware of environmental education concepts within the Natural Science subject and that they teach those concepts accordingly. It was further revealed that teachers are unable to interpret and understand the policy messages regarding the implementation of environmental education concepts. This is partly because even curriculum advisors, who are supposed to assist them, are not always available, due to the fact that one curriculum advisor has many schools to attend to. When these teachers get hold of curriculum advisors, the latter do not always have answers to problems faced by teachers in the process of curriculum policy implementation. Teachers further stated that the ways in which they implement the curriculum policy is mostly informed by the extent of the support they get from the Department of Education.

All the teachers interviewed mentioned that they had not been trained on how to implement environmental education as a cross-curricula subject; yet, they are expected to teach environmental themes within the Natural Science learning area. However, teachers still think it is necessary to have environmental education as a cross-curricula component. As a cross-curricula component, environmental education will ensure that all learners get an opportunity to learn about the environment in a manner that integrates it within the existing subjects (Transcripts 2, 4 & 5).

Data revealed that teachers' level of understanding of environmental education concepts within their subjects vary from one teacher to another. Teachers indicated that, since they were not trained on how to implement environmental education concepts within the subject, they teach those concepts using the same strategies they employ to teach Natural Science, such as textbook, chalkboard, and question and answer methods (Transcripts 2 & 4). It was revealed during the interviews that teachers are not able to respond to curriculum policy as they should, due to their respective school environments. The schools in which they find themselves do not offer opportunities to complement teaching on environmental educational concepts.

4.4.3The Influence of Policy Signal on Teachers' Interpretation of and Response to Curriculum Policy Implementation

Policy signal refers to the policy messages which, if unclear and without attainable objectives, remain wishes in the document, in that they do not reach the destined jurisdiction (Spillane et al. 2002:387-512). Hence, it is crucial to ensure that the policy messages are clear or unambiguous, and implementable. During the observations, teachers had their lesson plans, but they were not following these lesson plans. When questioned about this, they indicated that they only did lesson plans for formality, as required by the policy; they continue to teach the best way possible for them. In this regard, Spillane et al. (2002:387-512) contend that policy implementers are more likely to implement policies that fit their agendas and those that do not are more likely to be either opposed or modified so that they do fit.

4.4.3.1 Teachers' interpretation of and response to curriculum policy implementation

Teachers' understanding of the curriculum policy significantly influences the methods and strategies that they use to implement the curriculum. This transpires in the classroom during the teaching and learning process. This is consistent with Wedell's (2009:39-58) contention that change is very unlikely to reach institutionalised stages if policy makers ignore existing local practices and beliefs when they decide on the content of curricula and the process of change. Indeed, teachers indicated that they interpret the curriculum policy based on how they understand the policy. This means that they do not exactly know the "how" aspect of the implementation of the policy. It must be emphasised that different teachers have different interpretations of the same curriculum policy, depending on their environments and understanding of the policy.

The findings of the study further revealed that teachers experience a feeling of disenchantment with the process of curriculum policy implementation. This is partly because changes are made to curriculum policies without their involvement at the initial stages of these policies. Thus, teachers' interpretation of the curriculum policy is based on how they have been teaching in the classroom. Cognitive science scholarship suggests that what individuals' make of new information is strongly related to their prior knowledge, expertise, values, beliefs, and experiences. This component of the cognitive framework involves applying comprehension and interpretation to an analysis of teachers' sense-making of the policy and complex practices related to learning and teaching (Spillane et al. 2002:387-512). During the interviews, teachers highlighted that, although they do implement the curriculum policy, the ways in which they do so is mostly influenced by their prior knowledge, beliefs, and experiences. Many of the interviewed teachers have been in the teaching profession for more than 16 years; of the total one has been in the teaching profession for eight years and the rest have been teachers for more than 16 years. Thus they have experienced numerous curriculum policy changes in the South African education system. Therefore, their prior knowledge, beliefs, and experience guide how they interpret and respond to curriculum policy implementation.

4.4.3.2 Teacher support for a successful curriculum policy implementation

The objective of teacher-support training and development is to effectively capacitate teachers so that they are able to implement the curriculum policy in order to achieve quality education. Principals remain the primary source of support for teachers in schools; this

means that principals are expected to assist the teachers in handling challenges in schools. According to Brynard and De Coning (2006), in Brynard and Netshikhophani (2011:60-72), capacity includes such intangible attributes as the leadership, motivation, commitment, willingness, courage, and endurance that are needed to translate theory into practice. Teachers' frustrations with the implementation of the curriculum policy on environmental education within the Natural Science learning area are the result of poor or lack of teacher support in terms of training and development. During the interviews, teachers indicated that, although the department does provide them with training to support them, such support is limited to 2-3 days and, at most, and does not respond to their needs (Transcripts 3 & 5). Teachers further indicated that during those training days, they will be given materials and then will be expected to go and implement their contents; and there will be no one to monitor if they are implementing as expected.

Most teachers indicated that they are implementing CAPS without proper training on the implementation of this policy. These teachers felt that they should have been trained properly on the implementation of the policy. They also stressed that curriculum advisors needed to provide practical applications of the new knowledge. Teachers also felt that there should be a balance between prior knowledge and new information when changes are introduced.

Clearly, the teachers' responses discussed above indicate a feeling of inadequacy with respect to handling new information; hence, they feel that they need more training. Training offers the most viable opportunity to inform teachers of the developments in the curriculum.

Curriculum implementers need to be prepared for and supported in the successful execution of their tasks (Jacobs, Vakalisa & Gawe 2011:186) for the simple reason that it would be unfair to expect teachers to implement a written curriculum policy successfully without training. Furthermore, the top-bottom approach, whereby those in senior posts decide on the content of the policy and actually design the policy, partly influences the implementation of the policies. In this respect, teachers stated during the interviews that they experience challenges and frustrations when they are unable to receive the support that they need to ensure successful implementation of the curriculum policy.

4.4.3.3 Teachers' inability to interpret and understand policy messages due to the influence of the top-down organisational approach of the South African education system

Issues affecting the implementation of policy vary from one school, organisation or institution to another. Hence, Hope (2002:40-44) remarks that “transforming educational policy into practice, regardless of the level from which it emanates is not an easy task”. There can be many obstacles to implementing policy. These include implementers' indifference or apathy towards the policy, the lack of resources, insufficient time for implementation, and disagreement about how to achieve results. Spillane (1998:33-43) identifies more factors that influence the policy adaptation process, namely, individual and institutional agenda, community attitudes, material resources, and time.

Local educators interpret policies in the light of their local vision; policies that are in line with local visions are endorsed, while those that deviate from it are rejected or altered accordingly. As indicated earlier, the top-down organisational system influences the policy. Morris & Scott (2003:71-84) highlight that, within centralised organisations, there are often problems with the transmission of policy intent from the most senior level through the mid-level managers to the point of delivery. As mentioned earlier, principals' inability to formulate clear policy outcomes or to adequately oversee the implementation process is due to poor interpretation of the curriculum policy. This hinders the successful implementation of the policy.

One of the teachers confessed that, at times he found it very difficult to follow what the curriculum policy expects him to do, which shows teachers' inability to interpret and understand the policy messages (Transcript 1). Teachers feel that they are not afforded sufficient time to understand curriculum policy messages before implementation. They also indicated that the resources that they have at their disposal hamper the successful implementation of curriculum policy. The interviewed teachers highlighted the impact of insufficient human resource support on the successful implementation of the curriculum policy on environmental education within the Natural Science learning area. This really limits teachers' ability to fulfil policy intentions; consequently, they only implement what is possible.

4.4.3.4 Communication between policy makers and policy implementers with regard to curriculum policy implementation

The communication of policy is often overlooked, even though it is an important dimension of policy implementation. It suffices to note that policy communication takes many forms, such as legislation, memoranda, personal, or collective. Regardless of the form used, the policy must be clearly communicated to all stakeholders. Such communication should take into account the knowledge and situational expertise of policy implementers. The process should also ensure that opportunities are provided to policy implementers to encourage them to engage in dialogue and policy interpretation with fellow teachers. This will enable them to develop shared common understanding of what the policy implementation entails. Failure to provide such opportunities would result in teachers persisting in implementing policy according to available resources and their personal or professional attributes.

Policy implementers often disregard policies that they do not understand and only implement the ones that they can relate to. This reinforces the view that successful curriculum policy implementation depends on effective communication, and the provision of sufficient time and resources for policy implementers. In communicating a policy, policy makers should assist policy implementers to understand how to integrate the policy message in the local context, taking into consideration their own experiences, while still serving as mechanisms by which local knowledge is communicated to the district or the state.

It should be noted that, in the absence of time and resources to engage in discussions and communicate the content of a policy in a meaningful and credible manner, the current educational policy will not be as effective as expected. Indeed, one teacher emphasised that working in isolation accounts for the different ways in which teachers interpret and respond to the same policy. This teacher indicated that, at the school where she teaches, there are two teachers offering Natural Science in Grade 9. She noted that although both implement environmental education concepts in the same subject, each teacher responds to curriculum policy implementation differently. In other words, each one of these two teachers teaches the way that best suits his or her learners.

Clearly, the way in which teachers interpret and respond to curriculum policy depends on how they interpret the policy itself. It becomes evident that inadequate or lack of communication among implementing agents and agencies leads to a misunderstanding of the

policy, which affects its implementation. Another teacher suggested that policy makers ensure that a feasibility study is conducted. The latter should include all types of schools, in order to understand what all these schools need to do to ensure successful implementation of a curriculum policy.

4.5 RESEARCH FINDINGS AND DISCUSSION

All the teachers interviewed and observed were sufficiently qualified to teach. That is, they all have the minimum required by the teacher certification body to become a teacher. Most of them have more than 16 years of teaching experience.

Table 4.3: Profile of teachers involved in the study

Teacher	Name of school	Qualification	Number of years of experience	Area of specialisation
Teacher 1	A	BEd	19	Maths & Science
Teacher 2	B	Teacher Certificate in Education	8	Maths & Science
Teacher 3	B	BAEd	25	Biology & Afrikaans
Teacher 4	C	BEd	22	Mathematics
Teacher 5	C	Diploma in Education	19	Maths & Science

Note: Table 4.2 provides a summary of the involved teachers' qualifications and teaching experience, in years. As mentioned earlier, many teachers have been teaching since the dawn of democracy in South Africa, in 1994.

Document analysis also revealed that teacher training was aimed at teacher development, while curriculum advisors' training targeted professional development. While interviews show that teacher developmental training plays a significant role in the successful implementation of curriculum policy in schools, teachers nonetheless indicated that they had not been trained on how to implement curriculum policy. This had an influence on how teachers understand and interpret policies that guide the implementation of environmental education within Natural Science. Furthermore, the high rate of vacancies for teaching positions in the Department of Education, as depicted in the document analysis, results in some teachers having to teach subjects that they do not specialise in. For instance, some

teachers indicated that they teach Natural Science, although they are not specialists in that subject. They blamed this on the organisational structure of the South African education system: they were unilaterally assigned these subjects.

With regard to the questions on teachers' knowledge of what informs the provision of environmental education in the curriculum, they all had different understandings. Interviews revealed that, due to these varying understandings and background knowledge on the integration of environmental education in the curriculum, teachers' implementation of environmental education is influenced by how they understand it and by their teaching experience. In response to the question on the above-mentioned aspect of the study, one interviewed teacher remarked that:

“Because environmental okay, you see we can have environmental education as a separate subject on its own or have it as a cross curricula component. Well I think if we have it separate, hmm I do not know was it separate before? If we have it separate two things might happen then, its either we will be repeating concepts you understand or link emphasis on concepts you understand” (Transcript 2).

And another teacher said that:

“Actually my understanding is that environmental issues should be taught as part of ... each and every learning area should be part of environment in the curriculum. So it should be included in all learning areas. Ensure that they do not hear about environmental issues during Natural Science only, but also in the other subjects like English” (Transcript 1).

The other teacher related this to the challenging experience of shortage of textbooks even for the subjects areas that has been in the curriculum for a long time and shared how environmental education as a subject could suffer in terms of textbooks and qualified teachers' availability. The teacher mentioned that:

“I think if we have it as a separate subject it is going to be tough. We are struggling with textbooks now for the subject that have been in the curriculum for long. So if we can have this it's going to be very difficult also in getting qualified teachers in that field.

What we could do maybe is ensure that we cover concepts in environmental education in all the subjects in the curriculum” (Transcript 4).

Teachers further indicated that, although they are teaching environmental education concepts in Grade 9 Natural Science, their teaching strategies are strongly dictated by their own interpretation of how they should teach these concepts rather than the curriculum policy. They attribute this to their lack of training on how to implement environmental education concepts within their subject. They also underscored that although they were not offered training on how to implement the CAPS policy, they are implementing it as expected. Another teacher indicated that:

“I have never been to training for such but I went to one workshop whereby they were briefing us about the syllabus. I was frustrated because the examples they were using were not helping me in the real sense of it. I think it would have been better should they have allowed us to share the challenges we have and they help us on things that we are doing or experiencing in schools. I still feel that if maybe the curriculum advisors can group us accordingly and arrange a workshop that will deal with challenges we raised with when they do their support visits. But because they do not come they do not know the problems we experience hence the workshops are way from our expectations. So they cannot even do follow-ups because they know that how to help us” (Transcript 4).

Classroom observations revealed that teachers do not have sufficient knowledge on the use of available resources to support the teaching of environmental education within the Natural Science subject. Teachers also indicated that they use textbooks to teach environmental education concepts within the Natural Science subject. Interviews also revealed that the successful implementation of a curriculum policy is influenced by the availability of resources. One teacher mentioned that except for textbooks, he do research on the concepts and download information; make copies for the learners in the form of notes and explain to them during the class. The teachers continued to say that:

“The curriculum policy is just there to guide them. Okay when you the plan that is okay this is how I can plan, this is how I can deliver my message and the learners will understand, but you see individual interest also add more to what you deliver in class. In my years of teaching I’ve come across different learners and I now understand that. Teaching and learning has to go in the class, firstly, discipline must be instilled in the

class and after discipline in the class is interest of the teacher in that subject, if you are interested in the subject you know it motivates you to go all the way to look for resources. You will look for resources, solution to problems in order for you to disseminate properly. Another thing is passion for what you do, if you do not have passion for what you are doing you will just do it because that is what you have to do. The fact that a teachers need to derive joy in making others see what they do not see in a better way that motivates me” (Transcript 2).

The teacher further indicated that he is influenced by the passion to teach the subject; hence he goes the extra mile in ensuring that learners learn and understand the concepts. This was evident during the classroom observation; while the teacher was teaching, learners were listening, without taking notes. When the teacher was asked to justify this, the following explanation was given:

“All right number one, first and foremost I prefer them to listen, you understand I tell them there is a time to take notes except when I’m talking I make mention of things that are a bit out of what they already know they can jot it down. I encourage them to do that and tell them what to do like when is time to write notes they write notes, but I take time to explain to them communicatively you interactively so, so that the idea will sink into their minds. They would not have it in their books, but in their minds. Okay: You understand and I believe in interaction one would ... so that’s why I involve them because if they are writing and I’m talking second point, some points I make they might not get them they might not be able to get everything” (Transcript 2).

However, teachers from the rural schools which do not have such resources as the Internet to search for extra information on the concepts relating to environmental education find it difficult to teach this component. They have to depend on textbooks whenever they have to teach.

Regarding the questions on how Natural Science teachers understand and interpret curriculum policy for successful implementation in schools, document analysis revealed that teacher-support training remains crucial in preparing teachers for successful and effective curriculum policy implementation. However, interviewed teachers indicated that they did not receive teacher training support. The only workshop they had attended was scheduled for two to three days, but failed to provide them with the support they needed to implement the

curriculum policy. Furthermore, they had not been able to get the needed support from curriculum advisors. This is due to the shortage of the latter in the province. One teacher stressed that it is difficult to get hold of curriculum advisors because they themselves indicate that they have their own challenges i.e. transport issues from the office to schools, distance and issues of travel allowances which impact on their school visits.

Document analysis also showed that the number of schools visited by circuit officials is inadequate when related to the number of schools in the province. The total number of public ordinary schools in the province, within the 134 circuit offices do not complement the number of curriculum advisors trained to provide support to all the schools in the province. This inadequacy results in poor monitoring and evaluation of policy, which hinders successful curriculum policy implementation in schools, since these officials are unable to effectively support teachers.

Content analysis confirmed that teacher-support training did not occur. The official documents showed that there were plans to provide teachers with training; but that training could not be offered before the end of the financial year as scheduled. Nevertheless, a budget had been set aside to ensure that curriculum advisors were able to visit schools to offer teacher support in terms of curriculum implementation in schools and for quality assurance.

Regarding Grade 9 Natural Science teachers' understanding of the curriculum policy implementation, interviews revealed that teachers do have different understandings of curriculum policy implementation. This is partly because their interpretation of curriculum policy is influenced by their teaching experience, the availability of resources, and the ways in which they understand the policies within their specific context. Teachers from public schools located in rural areas have a similar understanding of the curriculum policy implementation, because they are exposed to the same challenges. They indicated that their schools' contexts significantly dictated how they taught learners in the classroom. Because of a lack of appropriate resources, their classes are normally overcrowded; as such, individual attention to each learner is not possible. Instead of allowing learners to do some research work by themselves, these teachers do the research for the learners. This is due to a shortage of computer laboratories. Instead, the school will have two or three computers for administration usage only. Because of a lack of resources, teachers have to improvise or do what is possible, for formal purposes: lesson planning done as per the requirement of the

policy, but teaching done differently. On the contrary, teachers in urban area schools have computer laboratories, science laboratories, and other resources. What is more, the classes are not overcrowded.

The content analysis of the Department of Education's Annual Performance Plan 2013/14 revealed that this department is aware of its poor performance, which led to it receiving an unclean bill of health, based on the Auditor General's findings. The Auditor General's report attributed the poor performance of the Limpopo Department of Education to poor compliance with policies, supply chain management issues, poor quality of financial reporting, human resource management issues, to list but a few. In the annual report of the Department of Education, recommendations were made to enforce the relevant sections' compliance to policies, legislations, and Treasury regulations. It was also recommended that strict measures be taken against those who are resistant. However, providing efficient and effective monitoring and evaluation strategies are in place, practices may remain unchanged.

4.6 CONCLUDING REMARKS

This chapter provided an analysis and interpretation of data on teachers' understanding of and response to the implementation of the curriculum policy on environmental education within the Natural Science subject in schools. The chapter shed some light on how and why teachers respond to curriculum policy implementation in schools, and discussed the factors influencing teachers' curriculum policy implementation. It was noted that teachers, school managers, and curriculum support staff members play a crucial role in the integration of environmental education in the curriculum. In some schools, principals are perceived by teachers as unenthusiastic about environmental learning. They are reluctant to participate in environmental initiatives that support the implementation of the environmental education policy in the curriculum. As a result of poor support from the principals, teachers are bound to respond to the curriculum policy in ways that are incongruent with expectations.

The literature review showed that some principals' knowledge of environmental learning is still very shallow. Themes that emerged from the data, as analysed and interpreted under the different categories of the cognitive framework, showed that teachers are encouraged or discouraged by different factors in their attempts to interpret and react to the curriculum policy. The themes categorised under individual cognition revealed how teachers, as

individual sense-makers interpret policy messages, as well as how prior knowledge, beliefs, and experiences influence the construction of new understanding. Individual cognition-related themes addressed the research question on what influences Natural Science teachers' understanding of curriculum policy implementation. Themes discussed under situated cognition tackled issues of the availability of resources in schools, which plays a significant role in the teaching and learning environment. The focus on situated cognition underscored the fact that the individual sense-making process occurs in a social setting and influences implementing agents' interpretation of what they notice. This provides a basis for how schools can influence the way in which teachers teach in the classroom. Finally, themes outlined and discussed under policy signal dealt with the messages, as documented in the policy, and the availability of support for teachers to put into practice those policy messages. It was highlighted that if policy messages are unclear and without attainable objectives, the possibility is that they will remain wishes in the document. That is, they will not reach the destined jurisdiction, because teachers will either modify or ignore them. This category also revealed that the main factor which accounts for the mismatch between curriculum policy implementation and teachers' classroom practices is the fact that curriculum planners and educational policy makers – who often focus on the planning and initiation issues – ignore the dilemmas and obstacles faced by teachers during the actual implementation. Some of these challenges were raised by teachers during the interviews.

In short, the application of the cognitive framework in this study has provided some clarity on what influences teachers' response and how they actually respond to curriculum policy implementation, as well as their understanding of environmental education within the Natural Science curriculum. The next chapter provides the educational implications of the study, its recommendations, and the conclusion thereof.

CHAPTER 5 : IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

This study is located in the field of educational policy implementation. Its overall aim was to develop an understanding of how Natural Science teachers implement the curriculum policy on environmental education within the Natural Science subject. The study was limited to Grade 9 teachers from the General Education and Training band of the South African education system.

The study explored how and why Grade 9 Natural Science teachers in South Africa make sense of and react to the policy regarding the teaching of environmental education in the Natural Sciences classroom. It must be underscored that environmental education is regarded as an important tool in the effort to stimulate a well-informed global response to environmental challenges. The study aimed at developing an understanding of what encourages teachers or discourages them from responding to the environmental education policy as intended. Such an understanding would help education reformers to establish the kinds of support needed by teachers to effectively implement the curriculum policy on environmental teaching in the Natural Science learning area in particular, and other learning areas in general.

The study was conducted according to a qualitative research design. This is because the intention was to collect descriptive data, that is, the participants' spoken or written words. It suffices to note that this is one of the major distinguishing characteristics of the qualitative research paradigm (McMillan & Schumacher 1997:107). The function of data collection techniques in a qualitative study is to capture both the richness and complexity of behaviours that are displayed in a natural setting. The data collection and analysis highlighted participants' perspectives. The collected data were analysed inductively to generate findings. In order to extract more in-depth verbal information from the participants, interviews were used. These, together with both document analysis and observations, constitute the main instruments of data collection. The basic steps of qualitative data analysis were followed, namely, data collection, note-taking, coding, sorting, and writing up. Interviews were transcribed and analysed following Giorgi's (2009) phenomenological steps which offered an opportunity to interrogate the data collected from the different teachers in order to

establish themes. These themes were grouped according to the cognitive framework and were discussed in detail.

The present chapter highlights the implications of the study. This is followed by recommendations on the necessary improvements to ensure the successful implementation of the curriculum policy on environmental education in schools. The last part of the chapter makes concluding remarks on the status of the implementation of the curriculum policy on environmental education within the Natural Science learning area in the South African context. The implications of this study will be detailed in this chapter. It suffices to note that the study has laid the foundation on how to deal with the factors that influence teachers' interpretation of and encourage or discourage their response to curriculum policy implementation.

The findings of the study reveal that teachers' interpretation of curriculum policy is influenced by, among other factors, teachers' teaching experience and beliefs, the availability of resources, and the ways in which they understand the relevant policies in their respective contexts. All the teachers from public schools located in rural areas have a similar understanding of curriculum policy implementation. This is because they are exposed to the same challenges. The availability of resources plays a significant role in influencing how teachers react to curriculum policy implementation in schools. All the teachers from rural schools share the same sentiments regarding curriculum policy implementation. The findings show that teachers are not implementing the curriculum policy as expected because of a lack of the necessary resources. The findings further reveal that teachers' beliefs and experiences influence how and why they respond to the curriculum policy. Teachers indicated that, because what the policy expects them to do is not always possible, they resort to teaching environmental education the same way they approach other subjects.

5.2 EDUCATIONAL IMPLICATIONS OF THE STUDY

The study has revealed that teachers are influenced by different factors. These factors are characterised and explained according to the three categories of the cognitive framework, namely, individual cognition, situated cognition, and policy signal. Based on these three categories, teachers respond to curriculum policy implementation differently and they are influenced by different factors within their respective work environments.

Individual cognition maintains that teachers respond to curriculum policy implementation based on their prior knowledge, beliefs, and experiences which influence the construction of new understanding. Teachers, during their individual processes of understanding, interpretation and filtering of policy messages, depend on their prior knowledge and experiences. The literature review revealed that individuals do not make sense of the world in a vacuum; their interpretation of a policy is situated in particular communities of thought which include political parties, other types of organisations, and religions. The process of teachers' construction and interpretation of their own practices plays a fundamental role in the successful implementation of curriculum policy. Hence, it remains crucial for curriculum policy designers to engage and involve curriculum policy implementers during the planning stage of the curriculum policy. When all stakeholders are involved and well informed about the curriculum, the process of implementation becomes easier because all parties will know, from the outset, what is expected of them. Therefore, it is recommended that curriculum policy designers and the Department of Education ensure that teachers – as primary curriculum policy implementers in schools – are involved at the initial stage of the design, so as to ensure that teachers are clear about what the curriculum policy expects of them.

Teachers indicated that – generally – they only learn about the curriculum at the implementation stage where they are provided with training which usually last 2-3 days. They think that this is not enough. Consequently, they transform the policy as they interpret and act on it in order to meet the demands of their work. Thus, the South African Department of Education should ensure that sufficient training is provided to teachers so that they are able to construct meaning, and interpret and align their practices with the policy messages. Since those who decide on what should be in the policy are seldom responsible for its implementation, it becomes necessary that policy implementers are well trained so that they gain a similar knowledge and understanding of the policy as policy makers. This will not only encourage them to embrace policy messages, but will also ensure smooth curriculum policy implementation.

Clear lines of communication between policy makers and policy implementers should be created to ensure the success of curriculum policy implementation. Indeed, literature has revealed that policy communication has often been overlooked; yet it is an important dimension of policy implementation. Consequently, policy communication needs to be

prioritised from the policy design process to the policy implementation stage. Such communication could take the form of the circulation of written legislation, memoranda from the district, or information conveyed through principals who then brief teachers. The policy implementation process should take into cognisance the fact that enough opportunities should be given to policy implementers to engage in dialogue and initiatives to interpret the policy in collaboration with their colleagues. This will enable them to develop a common understanding of what they are expected to implement and how. If such opportunities are not provided, teachers will continue to depend on their experience and beliefs, and will implement what is possible and ignore what they find challenging. For successful curriculum policy implementation, teachers should be provided with opportunities that will give them a better understanding of policy messages.

The study further found that issues relating to situational context and social interaction also play a significant role in encouraging or discouraging teachers from implementing the curriculum policy in their own ways, as opposed to the way prescribed in the policy document. Data collected revealed that teachers are located in different government schools which are not equally resourced; yet they are all expected to implement the same curriculum policy as prescribed. Such unequal distribution of resources in schools influences teachers' interpretation of and response to curriculum policy implementation. Depending on the availability of resources, teachers implement curriculum policy in the ways they find most suitable to them. This provides a platform for one to argue that the availability of resources in schools plays a significant role in the successful or unsuccessful implementation of curriculum policy. Unless schools are equally resourced, there will remain a disjuncture between how and why teachers interpret and implement the curriculum policy differently, depending on whether they are in well-resourced or partially resourced schools. As indicated by the findings based on the interviews, teachers from schools located in urban areas recognised that they do have resources and are able to implement the curriculum policy. Therefore, it becomes crucial for the Department of Education to ensure that schools are equally resourced and that all teachers are properly capacitated on the use and management of the available resources.

The document analysis shows that the department has embarked on merging schools in order to ensure that resources are shared effectively and efficiently. This approach will assist in curbing the dire shortage of resources in some schools. It must be stressed that this situation

does not only affect teachers' curriculum policy implementation, but also their retention and learners' academic performance.

The findings of the study further point out that teachers' social interactions within their situational context strongly influence their response to curriculum policy implementation. This is because their process of understanding and interpreting the curriculum policy implementation happens in isolation, in their respective school settings. Teachers maintained that poor social contact with colleagues and education officials affected their ways of implementing the curriculum policy. This is because they are unable to share their frustrations and collectively come up with an effective policy implementation process. Thus, to ensure a smooth curriculum policy implementation process, teachers from different schools should be grouped and be provided with follow-up training after the initial training offered to all the schools. This will create the space for teachers to raise the concerns and challenges they face during the implementation process. In this way, they will be able to assist each other when they encounter problems. For its part, the Department of Education should endeavour to conduct the monitoring and evaluation of the policy implementation process efficiently.

Policy signal is another factor that influences how teachers interpret and implement the curriculum policy. The signal must be clear if it is to change teachers' habitual ways of teaching in a classroom environment. Policy messages also play a significant role in how teachers interpret and respond to curriculum policy implementation.

The findings of the study, based on the interviews with teachers, reveal that teachers are frustrated by curriculum policy changes. They indicated that since 1994, there have been many curriculum policy changes; some policies were repealed before they could even be implemented. They indicated that, at the moment, Grade 9 Natural Science teachers are implementing the 2013 CAPS policy without prior training.

The literature review showed that the top-bottom approach of the South African education system has an influence on teachers' interpretation of and response to curriculum policy implementation. Data collected through interviews show that teachers are not well supported with regard to curriculum policy implementation. Studies on policy implementation found that policy implementers only apply what is possible for them and ignore or modify that

which challenges them. During the interviews, teachers revealed that they teach the way in which they have always been teaching because that has yielded positive results. The observations revealed that teachers do plan their lessons according to the requirements of the curriculum policy, but the actual teaching in the classroom is inconsistent with the lesson plan.

The findings of the research further revealed that all the teachers interviewed have not been trained on how to implement environmental education as a cross-curricula subject; yet they are expected to teach environmental concepts in Natural Science. However, these teachers still think it very necessary to have environmental education as a cross-curricula component as this will ensure that all learners get an opportunity to learn about the environment. The findings also highlight a lack of understanding of the policies that shape the inclusion of environmental education in the curriculum. None of the teachers interviewed referred to a specific policy that shapes the status of environmental education in the curriculum. Teachers indicated that they only know about environmental concepts in Natural Science and teach them just like any other subject.

Data revealed that teachers' level of understanding of environmental education concepts within the subject vary from one teacher to another. Teachers indicated that since they were not trained on how to implement environmental education concepts within their subject, they teach those concepts using the same strategies that they use to teach Natural Science, namely, textbook method, chalkboard, and question and answer methods. It was revealed during the interviews that teachers are not able to implement curriculum policy as they should due to their respective school environments. The schools in which they find themselves do not offer opportunities to complement the learning of environmental education concepts with illustrations from the local environments.

It was established during the observations that teachers' understanding of environmental education in the curriculum is limited to environmental education concepts within the Natural Science subject. In their schools, they do not have vegetable or flower gardens which could be used as teaching resources to enlighten learners about the process of photosynthesis, the effects of climate change, absorption, and other phenomena. In mathematics, they could learn to measure the amount of water needed for specific types of plants, the growth of plants in weeks or months. In commercial subjects, they could learn about the relationship between

supply, demand and production, entrepreneurial skills, the creation of job opportunities for local people in those gardens, and how to supplement school feeding schemes with fresh vegetables from school gardens.

Such gardens would also assist in creating and increasing learners' understanding of the mutual relationship between the environment and society. Schools should be encouraged to have vegetable, flower, or herb gardens for the purposes of environmental learning in schools. This will provide learners with life-long learning opportunities on the different uses of herbs to respond to different sicknesses, address malnutrition, and respond to the economic needs of the Limpopo Province and those of South Africa as a whole.

5.3 RECOMMENDATIONS OF THE STUDY

The study revealed that teachers are not physically well monitored in terms of the implementation of the curriculum policy. It was discovered that some teachers only see the curriculum advisors once or twice in a year. The fact that they work in isolation compounds the challenge of implementing the curriculum policy, because they do not have anyone to assist them when faced with challenges. Therefore, the Department of Education should ensure that effective monitoring and evaluation systems are in place and are strengthened to ensure that teachers in all schools are well supported and able to implement curriculum policies as intended. The availability of effective monitoring and evaluation control systems will ensure that challenges are identified and immediately addressed so as to ensure the successful implementation of curriculum policy in schools. Teachers need to be trained properly and effectively, and should be supported during the implementation of the curriculum policy. Failure to support them will result in the application of what they believe in, instead of what is expected of them.

Drawing from the content analysis, the Department of Education should ensure that teachers' level of understanding of policy intentions and their competence in content subjects are enhanced. The Department of Education should closely monitor the implementation of the curriculum policy regarding the delivery of education and other services to schools. This is to ensure that schools are functional and that learners are provided with quality education. Promoting and implementing policy for curriculum delivery and support should remain a priority.

During the interviews, teachers mentioned that the teaching profession is no longer as interesting as it used to be. The system of school organisation is too demanding and teachers are not sufficiently supported to meet the demands of their profession.

Interestingly, the findings of the study conducted by the Department of Education have also revealed that curriculum advisors themselves do not have sufficient knowledge and skills to offer teachers the support they require (DoE 2009:154). Therefore, it becomes crucial that the Department of Education make provision for enough, well-qualified, and knowledgeable curriculum advisors who would be able to provide teacher support in different fields in schools. These advisors should be able to provide quality support to teachers with regard to curriculum delivery and policy implementation in schools. Without the expertise and knowledge of teacher supporters or curriculum advisors, teachers will always be pessimistic about curriculum policy implementation. There is a significant possibility that teachers will continue to implement curriculum policies in their own way, if they are not well-supported and assisted when they need help and guidance.

Curriculum advisors should also be able to understand the processes involved in curriculum policy implementation so that they are able to provide practical support to teachers. The Department of Education should ensure that curriculum advisors are provided with sufficient training so that they are able to respond to the curriculum policy implementation challenges faced by teachers in schools. It is also necessary to have curriculum advisors who meet regularly with teachers to share experiences and discuss issues of curriculum development, design, and implementation. This will provide teachers with opportunities to build relationships with one another; begin to work together, instead of in silos; and support each other. Such collaboration will ensure that learners from different schools acquire the same understanding of environmental concepts; that they have the same opportunity of learning; and that are able to fit in any school, if provided an opportunity to do so.

The findings of this study showed that the unequal distribution of resources between schools poses a challenge to teachers' implementation of curriculum policy. Indeed, disparities exist between schools in rural areas and those in urban settings with regard to the availability of resources. Schools in urban set-ups have better resources than schools in rural areas. Hence,

curriculum policy implementation in the former is possible, while its application in the latter is selective and limited.

The unequal distribution of resources in schools has a negative impact on curriculum policy implementation. This, in turn, reduces opportunities for learners in underprivileged schools to access quality education; and hinders the realisation of the goal of improved education and training, as envisaged in the National Development Plan informed by Schooling (2030). The provision of school infrastructure will also ensure that teachers are able to implement the curriculum policy as intended. One of the challenges that teachers are faced with is the issue of overcrowded classrooms. This limits teachers' ability to provide individual support or attention to learners. If sufficient infrastructure is provided, in the form of classrooms and laboratories, teachers will be able to implement curriculum policies as intended. The Department of Education should also ensure that subject allocation is in line with teachers' qualifications and expertise. In schools, staff establishment should be responsive to the needs of the schools which should be informed by the subjects offered and the number of learners in those schools.

The study revealed that the communication of policy is often overlooked, although it is an important dimension of policy implementation. Policy communication can take many forms; it can be written in legislation; it can come in the form of a memorandum from the state or district officials; it can be expressed, individually, by district personnel who address it to principals who relay it to teachers; or, it can be communicated in a group setting, such as a workshop. The process of policy communication should ensure that enough opportunities are given to policy implementers to engage in dialogue and interpret the policy with their colleagues in order to develop a shared understanding of what they are expected to implement.

The Department of Education should ensure that there is a good working relationship between all the stakeholders involved in the education sector. Such a working relationship should enhance proper consultation with all stakeholders involved in issues regarding policy design, planning, and implementation. Teachers mentioned that curriculum policy changes have been happening regularly since the dawn of democracy in South Africa in 1994, and that they have been expected to implement these changes with minimal training. During the interviews, teachers indicated that they were not properly consulted or involved in the

process of curriculum change. However, they are expected to embrace the new curriculum policies and implement them according to policy makers' expectations. Hence, it becomes critical that proper consultation be undertaken and that all stakeholders involved be allowed the opportunity to be part of the curriculum development, design, and implementation processes, at their different levels. Such opportunities will ensure that all stakeholders involved understand the objectives of the new policies, the motives for the changes from the old curriculum, and what needs to be improved in the new curriculum policy. Teachers indicated that they continue to interpret and implement the curriculum policy the same way they used to, because they do not understand the policy and their respective schools do not offer much support to enable them to embrace the policy intentions. Hence, their interpretation and response to the policy is influenced by their beliefs, own knowledge, and experience. As suggested by cognitive science scholarship, the way individuals make sense of new information has much to do with their prior knowledge, expertise, values, beliefs, and experiences (Spillane et al. 2002:387-512).

In order for teachers to interpret and implement curriculum policy in schools as intended, it is necessary that they are involved and informed about the curriculum change processes well in advance. The objectives of the curriculum policy change should be clearly stated and it should be ensured that all stakeholders have the same understanding of the processes involved, and that they are clear about their roles. This should also consider teachers' beliefs, knowledge, and experience about classroom practices, since they are the main implementers of the curriculum policy in schools and currently make sense of new information based on their existing knowledge. As alluded to by Vandeya and Killen (2007:101-115), any effort to change teachers' pedagogical practice needs to acknowledge their conceptions.

5.4 CONCLUSION

The rationale for this study was outlined in Chapter 1 where the research questions that were explored were highlighted. However, the study could not provide solutions to all the challenges facing policy interpretation and implementation, that is, debates on this issue continue. Nonetheless, the study provided a foundation for current and future debates and contributed to the body of knowledge on how the process of teachers' interpretation of and reaction to curriculum policy implementation unfolds.

The findings of this study have revealed a gap between what the policy makers want to see happening and what the implementing agents actually do. As highlighted earlier, the purpose of the study was to develop an understanding of how Grade 9 Natural Science teachers implement environmental education within the Natural Science learning area. In this regard, it was revealed that there is no relationship between what policies makers expect policy implementers to do and how teachers interpret and respond to curriculum policy implementation. Teachers' interpretation and implementation of curriculum policy is influenced by the organisational or structural systems of the schools. It was found that the top-down structure of policy development left a lot to be desired for successful curriculum policy implementation in the South African context.

The fact that those who vote or decide what should be in the policy are neither the same people who design the policy, nor those who implement it creates confusion at the implementation stage. Teachers, as implementing agents, get challenged in the process but they do not have support systems to assist them in addressing these challenges; they also do not know how they should implement the policy. This is because the curriculum advisors who are supposed to assist teachers do not have answers or do not know everything about policy implementation, since they are also not the ones who develop the policies. Curriculum advisors also do not visit teachers regularly enough to give them the support they need, or help them with challenges they may be experiencing.

Thus, it can be argued that implementing agents should be involved in the process of policy development from the initial stage until the implementation stage; this means that they should not only see the policy at the implementation stage. This will ensure that teachers are aware of what is expected of them and are ready and prepared to embrace the policy messages with understanding. During the process teachers will be in a position to provide their views and opinions on the policies. This will enable them to make connections between what they already know and the new information in the policy.

The fact that government schools are not equally resourced remains an area of concern. Teachers, during the interviews and confirmed by observations, mentioned that they are not able to implement the curriculum policy as intended, because they do not have the educational resources to ensure smooth implementation of the curriculum policy. In most cases, teachers have to improvise in order to conduct experiments in the classroom by

borrowing experimental utensils from other schools, or by taking learners to the nearest school to do the experiments. Alternatively, they do experiments theoretically. Conversely, the same government schools in urban areas have access to well-equipped laboratories, libraries and so forth, and are able to conduct any experiment, at any given time.

Teachers indicated that, in South Africa, curriculum change has been taking place since the advent of democracy in 1994. Such changes have an impact on the teaching process because, before they can adapt to one policy, a new one has been introduced; and before the new one has been put into practice, it has been revised or changed, and another one has come in. It is therefore recommended that educational policy should emanate from the Constitution of the country so that the influence of change in political leadership does not affect the provision of quality education in schools, but continues to draw from the Constitution of South Africa. Such an approach will further reduce or limit the factors that result in curriculum policy changes. This will enable the country to move, at speed, towards achieving the Millennium Developmental Goals of providing all learners with quality education and eradicating illiteracy by the set time. In other words, it will ensure that the global initiative of “One Goal, Education for All” is achievable. The government has embarked on providing scholar transport and nutrition projects in schools to ensure that even the poorest children are able to access education and still get food for the day, which is commendable. However, unless issues of curriculum policy implementation are addressed, even such important projects may be negatively affected and fail in the long run, after costing the government billions of rands.

The contribution of this study consists in the fact that it highlights the challenges to policy implementation and teacher’s interpretation of the policy regarding the incorporation of environmental education in the Natural Sciences. The results of this study reveal that teachers’ interpretation of the curriculum policy is influenced by, among other things, their teaching experience, the availability of resources, and the ways in which they understand the policies within their respective contexts. The availability of resources influences how teachers interpret and implement curriculum policy. All the teachers in public schools located in the rural areas have a similar understanding of curriculum policy implementation and face the same infrastructural challenges and lack of resources. They indicate that their schools’ situation, to a greater extent, dictates how they teach learners in the classroom. Because of a lack of appropriate resources, their classes are normally overcrowded and individual attention to learners is not possible.

Furthermore, the study adds to the current debates on curriculum policy interpretation and implementation, as informed by the different categories of cognitive framework which better explain the stages of teachers' sense-making of and response to curriculum policy implementation. The first category is individual cognition which explains the process of understanding, interpretation, and filtering of the policy message. The second category is situated cognition which explains how the process of sense-making is influenced by the situational context. The third category is policy signal which elucidates how the policy messages influence teachers' interpretation and implementation of the curriculum policy.

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7. APPENDICES

7.1 APPENDIX 1: TRANSCRIPTIONS OF INTERVIEWS WITH NATURAL SCIENCE TEACHERS

TRANSCRIPT 1

Researcher: Thank you very much, sir, my name is Hlanganani Maggie Maluleke, a student at UNISA. I'm conducting interviews with Grade 9 educators who teach Natural Science. And now I'm going to interview you following up on lessons that I've observed while you were teaching. And let me put it up front that whatever that I'm going to gather from you, the information that I'm going to collect from you is not going to be used for anything else except for the purposes of my studies and you will never find your name being mentioned somewhere else or the name of the school. There is nowhere else where you will find your name or the name of your school. What I'm going to do, I will generalise all the information that I have gathered from the different schools, and because this is not the only school I'm collecting data from. I've been to different schools in Capricorn District since the study is based in Capricorn District, so yours happens to be one of the schools sampled in this study. Let's start with your qualification, do you have teaching qualification?

Teacher: Yes.

Researcher: What do you have?

Teacher: STD.

Researcher: STD.

Teacher: BEd.

Researcher: BEd, as in honours in Education?

Teacher: Yes, not honours as in honours, but is called BEd in Maths and Science.

Researcher: BEd in Maths and Science, and how many years of teaching experience do you have?

Teacher: 19 years.

Researcher: 19 years, [both laugh] and for how many years have you been teaching Natural Science?

Teacher: I can say 19 years because ever since I started teaching, I've been teaching Natural Science. Remember it was called general science then.

Researcher: Okay, all right and what is your field of specialisation?

Teacher: Science and Mathematics.

Researcher: And how do you find the teaching profession in general?

Teacher: In general, I have mixed feelings about it, there are ... we have had the good in the teaching profession and the shortcomings.

Researcher: Okay, so if you were to be offered another opportunity to decide, which profession would you go for now? With the experiences of the teaching profession, would you still continue with teaching as a profession, or would you say let me now go somewhere else and try something else.

Teacher: No, I prefer teaching, I prefer teaching things just need to be put in place and be made easier for us to ... otherwise I'm very much content to be a teacher.

Researcher: And then except for Natural Science do you teach any other subject?

Teacher: Yes, Mathematics.

Researcher: Maths, for what grade?

Teacher: I am teaching grade 11 and I also teach Life Orientation Grade 8 and 9.

Researcher: LO in Grade 8 and 9, all right. And then tell me have you heard about environmental education as a learning area across the curriculum and not as a subject on its own?

Teacher: No.

Researcher: You've not heard anything about Environmental Education as learning area?

Teacher: No, not as a learning area

Researcher: So have you ever been trained on how you can teach Environmental Education within Natural Science, you have not heard anything about it.

Teacher: Actually we just deal with environmental issues with the Natural Science itself, they are not specifically...

Researcher: So jah, you've got issues with the Natural Science as a learning area. Jah that's what I'm saying, not Environmental Education as a subject where you go and teach it as a subject.

Teacher: We teach it with Natural Science.

Researcher: In the Natural Science so in other words when you are teaching Natural Science, you touch on environmental issues.

Teacher: Yes, a lot.

Researcher: A lot, okay. But you have never been trained on how to do that, but is based on the training that you have received on other subjects, e.g. if it is for Natural Science and that is it. So, how do you find teaching these environmental issues within Natural Science? How do you ... do you see any linkage, and do you see any relationship between the two?

Teacher: Yes, because if you look at the science, especially the Life and Living is all about the environment. So a number of issues that we teach is about the environment in science is about environmental issues and stress on that one.

Researcher: So it means let's say for example when you are teaching about Natural Resource usage, that's where you dwell much into environmental education.

Teacher: Like with electricity, we talk much of the impact to the environment.

Researcher: Okay.

Teacher: Global warning and how it contributes to the environmental impacts so those are some of the issues.

Researcher: Okay, and you see that relationship making more sense.

Teacher: Yes, it makes a lot of sense.

Researcher: And learners are able to understand this relationship?

Teacher: Yes.

Researcher: While teaching such, what type of materials do you use, let's say when you are teaching Global Warming or it either electricity or its impact on the environment with Natural Science. Are you able to get teacher resources or materials that you can use?

Teacher: Actually I just use different books, anything that I can get, I even download information from the internet because our school, as you see, is actually not well resourced. Actually is totally not resourced, we do not even have the lab, the equipment, so we do not even have the lab, the equipment, so we just rely on using the information that we can get in any way.

Researcher: And so far, do you see a need of teaching such an environmental issues within the Natural Science?

Teacher: A lot.

Researcher: There's a lot of it, why do you maybe say you see a lot of it?

Teacher: You see science is about the interrelatedness of ...

Researcher: ...society, the relationship and the environment.

Teacher: So there's no way in which you can separate science from the immediate environment otherwise learners could not even understand, so long we talk about their immediate environment and not separate the two.

Researcher: Jah, okay. So if let's say you offered an opportunity to teach Environmental Education as a subject itself, will you go for it.

Teacher: Yes.

Researcher: You will go for it.

Teacher: Yes.

Researcher: And maybe how would you like it to be taught? Looking at the issues we have within the Natural Science and let say we have to zoom them out and say this is Environmental Education or Environmental learning, how would you like to see it being taught?

Teacher: Actually my understanding is that environmental issues should be taught as part of ... each and every learning area should be part of environment in the curriculum. So it should be included in all learning areas. Ensure that they do not hear about environmental issues during Natural Science only, but also in the other subjects like English.

Researcher: Let's quickly go to teacher support. You indicated that you have not been trained on environmental education training per se. You have not received such training.

Teacher: Yes.

Researcher: And then but have you received other teacher training programmes in relation to Natural Science.

Teacher: What I did, I just did my BEd majoring in Natural Science and Maths. I think that's what helped me a lot in expanding my knowledge in Natural Science and Maths with regard to environmental issues.

Researcher: If let's say you are to request for a teacher support training, what would you want those teacher supporters to come and train you on? What support will you expect from them to give you, if you are to ask for such a teacher-training support? What would you ask them to train you on?

Teacher: In my case I don't have specifics.

Researcher: You don't have specifics at the moment, but would you be able to recommend something in relation to teacher training.

Teacher: I would only recommend resources, such as teaching aids, anything that could be of help to educators.

Researcher: Okay, and at the moment do you have teaching aids?

Teacher: No.

Researcher: You don't have anything.

Teacher: We do not have actually anything.

Researcher: Even when I'm preparing a lesson I was sometimes referring learners to the nearest ... to see those pictures. Those are the things that would have been helpful if we had them.

Researcher: Who do you consult when you need support on Natural Science? Do you have curriculum advisors?

Teacher: We do have curriculum support staff but they ... we are not in a position to access them, they are not readily accessible, so it is a problem. Because they are citing the problem of being under-staffed.

Researcher: How much is your understanding of the new curriculum? The CAPS.

Teacher: I'm just going with the flow. I'm just trying to, I cannot say I have full understanding of it.

Researcher: You are going with the flow; did you receive any training on the implementation of the new curriculum?

Teacher: Jah, even though the training was just for 3 days, 3 hours but at least some of the things that are needed for the implementation of the curriculum we are able to.

Researcher: So it was 3 days and 3 hours per day?

Teachers: No, sometimes we go for workshops for 3 days sometimes it will be 3 hours.

Researchers: So that was not enough to prepare you to start implementing the curriculum?

Teacher: No.

Researcher: And then now with that amount of training that you have received, are you able to understand the policy intention and being in a position to respond to these intentions of the policy?

Teacher: Yes I understand the content of the policy, but my understanding is that they are too much ideal than real, so most of these intentions we are unable to practice more so in the situations that we found ourselves in.

Researcher: And then what seems to be the most challenging thing when it comes to maybe responding to the policy as you understand it. Because you indicated to me that you understand the policy intentions but the frustration comes in with the implementation of it as you supposed to respond according to what the policy want you to. You are being challenged by the situation where you find yourself in, is it how I understand you?

Teacher: Yes.

Researcher: So it becomes difficult to strike the balance between responding to the policy and understanding the policy intentions as they are. Right now because you are the principal and you are being frustrated because of this situation, I understand, it is even very difficult for you to take the message down to educators because if you yourself are being challenged it's obvious educators will be more challenged because you cannot do this and you cannot help them so much. Yes, you do understand what the policy wants you to do, but it is impossible for you to do as the policy wants you to. And then what do you think would be a possible solution to this problem?

Teacher: I don't see any short-term solution because we are having different situations. Maybe if the government try to come up with the feasibility study on different schools that will help them to come up with something that is tangible and possible to other schools in certain situations and maybe help those schools to go in line with curriculum. Maybe I think such feasibility study may become workable for all the schools.

Researcher: For all the schools, so if I understand you here what you are trying to tell is that the success of the policy also depends on the school, status of the schools. Now that we have schools but they are not equally equipped or equally resourced.

Teacher: Yes.

Researcher: It depends on how the policy will be received if it comes to school A it might be well received and will be able to be implemented but school B might suffer a bit and school C might not at all be able to implement it.

Teacher: So that is how best we can make it workable for all the schools, to implement the policy that we do not have the situation where we blame a certain school because they are not doing their best whereas others are doing well. You see.

Researcher: All right, so let's just go quickly on the questions about when you now have to respond to this policy yourself in this school. What are the issues that you consider first, as the new curriculum we have got CAPS now, you've been trained for 2-3 days, sometimes for 3 hours and you've to run with that policy, so what are the things that you consider first when you try to respond to the policy here in your school

environment? I believe within Natural Science most of the work that you are supposed to do is laboratory based. So if you are to respond to this policy in your situation you do not even have a lab, you even have a staffroom.

Teacher: We do not have a mobile lab.

Researcher: You do not even have ... so of course there are things that when you respond to the policy you have look into, you do not even have to search for them because they are obvious, you don't have to think of those things, like okay here is the policy it want us to do 1,2,3,4 and 5, where do I start? So in your case what are these that you look into?

Teacher: The infrastructure.

Researcher: The infrastructure, yes of course you do not have enough space for learners to start with, you do not have an office also.

Teacher: Yes I call this an office.

Researcher: No wonder you have got so many learners in this other class because you have used this classroom as an office which is actually supposed to be a classroom. All right, let's quickly go to your school's policy. How does your school's policy influences the way you teach in this school? In any way when you are trying to respond to the curriculum. The school's policy, how does it assist you in responding to this curriculum?

Teacher: One of the aspects of our school policy deals with assessment and we are always trying to make sure that our assessment policy in our school is in line with the government's policies. And we also in our school policy we also stress that we should always give feedback to parents then that makes teachers to be in a position to ... they are always ready to report to the parents, giving learners work and administer the work and so on, they compile schedules for each and every quarter so that they are able to give those reports.

Researcher: Because this new policy also expects parents to be fully involved in the teaching and learning of their children, how challenging is that for your environment?

Teacher: It is very much challenging, it's just that it is unfortunate that in villages such as this one this is a very small village and almost 50% of the learners who are here do not stay in this village, they are from other villages around and when you call parents you get a lot of excuses and some children maybe I think they just decide not to tell their parents.

Researcher: To tell their parents because obvious they know the answers.

Teacher: So what we do, we look at problematic learners and I'm saying problematic in the sense of progress in their work, not just saying or not involved in fights, but if we see that this learner has got difficulties and that the learner is doing his/her work properly, in that case we call individual parents then we able to talk to that parent but if we call parents in large numbers or all the parents we usually do not receive such positive response.

Researcher: But then what makes those learners coming from far because you mentioned that 50% of the learners are not coming from this village?

Teacher: I think one of them is the reputation of the school; this is a very small school but have doing well especially in matric results. The 4 past years we managed to obtain 100%.

Researcher: Ohh, that's good!

Teacher: And the previous year we got 100% and about 70% bachelors so I think that was the ... because you think that they come here and they will ... and of course it's the case because there are learners who left their schools in their village and came here and pass matric well and to our amazement we are asked by their former teachers,

what did you do with these ones, sometimes when you go to area like career institutions you meet them and they ask how come is this learner in Grade 12. So I think ... is the reputation of this is just that it is not drawing enough attention to number of learners to the school. Even if learners are coming from those villages we are still having a low general number of learners.

Researcher: How do you assist these Grade 9s because the Grade 9s are at the last grade of senior phase and then they exit they are going to FET. So how do you assist them to close the bridge between Grade 9 and FET? How do you prepare them to adjust properly when they enter FET?

Teacher: In that case we just practice them to ... actually we are drilling them to get used doing work on their own all the time doing a lot of work. That is basically what we do.

Researcher: What you do on how to assist them? And then from your own record, how has your Grade 10 been performing? Is it that they are coming from Grade 9 to Grade 10. How has they been performing?

Teacher: The grade 10 has been somehow a challenge, to the extent that we ... during some years we were forced to phase out other subjects because these learners especially with Mathematics, they are struggling, I don't know whether ... but as I look at the curriculum, the syllabus for Maths in Grade 8 & 9 and that one in Grade 10. I feel what to understand why these learners do not grasp the concepts in Grade 10 and we end up having just a small number of learners doing Mathematics in Grade 10. Ultimately at some stage we just phased ... we temporarily phased out pure mathematics, they all do Maths literacy for that year in Grade 10.

Researcher: But then when they continue to Grade 11 ...

Teacher: They will continue doing Maths literacy in Grade 11. For that year in Grade 10 we will not have pure Maths, but the following year we will have Pure Maths and learners who will do pure Maths.

Researcher: So is only at grade 10 where learners are doing Maths Literacy and then when they continue to Grade 11 they can either do Maths Lit or Pure Maths?

Teacher: No no, no they cannot cope, you know if we had a group of learners in Grade 10 this year doing Maths Lit next year they will be doing Maths Lit in Grade 11, all of them.

Researcher: So...

Teacher: And then when we reach Grade 12 during that year we would not have pure Maths only for that year, but as from there we will have.

Researcher: So at the moment you have Grade 10 that are doing Maths Lit?

Teacher: We said we do not have, we had a few learners, but they felt that they can't take it and we felt that we should talk to their parents and then we took them to other schools. We had less than 4 learners and there were 3 doing pure Maths. So we thought that we may actually waste of actual resources.

Researcher: So now you left with those who are doing Maths Lit. So it means that now in 2014, 2015 and 2016?

Teacher: 2016 we will not be having pure Maths in Grade 12, we will be having Maths Lit.

Researcher: Now let's now look into the lesson preparation. When you go to class to teach, do you first prepare your lesson?

Teacher: Yes, but I don't write ...

Researcher: You do not write anything?

Teacher: I use textbooks.

Researcher: You do not develop a lesson plan as ...

Teacher: A question of a lesson plan we debated this a lot with curriculum support staff about it ... we are agreeing on a number of times/terms on the types of lesson plans that they want us to do.

Researcher: Why is it a lot that they expect you to do or ...

Teacher: It is a lot and some of the things, you see it becomes a futile exercise when you just write things on a paper without going to actual practice them in the classroom, so it is.

Researcher: The argument here is because you do these lesson plans just for them to see that these are lesson plans I've done and you do not follow them in the classroom while teaching. As they consume much of your time.

Teacher: They consume much of our time.

Researcher: And with the lesson that you were teaching today, were you able to identify some environmental linkage to the lesson itself.

Teacher: Of course.

Researcher: What was that if I can ask?

Teacher: The use of ... the pregnancy itself is an environmental issue, it has a lot of effects on our teenagers especially to ladies who ... the issue of Foetal Alcohol Syndrome as we have said that is a problem because the government has to spend a lot on that.

Researcher: This cause the government to spend a lot in some of these things that you and me can say is not like their response to it have an impact on or is addressing the challenge on, because when they provide that grant with the idea that they want to assist these kids which are born, these teenagers are making more kids hoping to get more money. Which is costing the government a lot and in real sense we are to sit down myself and you we could say this money could be used to do something else or build a new schools instead of giving it to these kids because they do not even understand. I mean R380 I can't live with that R300 for 2 days ... I can't do anything.

Teacher: It does not even fill your petrol.

Researcher: It can't, it can just put maybe a quarter of my tank so I can come here and go home that's all. Let us look now into at the evidence that you have maybe to get to know that maybe your learners have understood the topic. What type of teaching strategies were you using to access whether learners have understood what you were talking about?

Teacher: With our learners I have realised that they have a problem of language that is why most of the things that I was discussing, and to see that they are in line with the policy, I sometimes use home language. I will have to ascertain myself if they are with me.

Researcher: And I could see that when you begin to talk in their language they could understand and when you ask them some of the sicknesses they were able to relate to in their own language. So the reason why you make use of the local language is because you understand where these learners are coming from.

Teacher: Yes,

Researcher: You understand the community and also the needs of these learners here. And then do you worry much about lesson objectives when you teach them?

Teacher: At the beginning I used to worry a lot at the beginning, but having assessed them I started to get to notice whether it was successful, if it was a good lesson but usually I'm trying to make sure that these learners get what I'm talking about. I used to worry about the objectives and I think that should remain every teacher's concern because you do not just go to class to teach, but they also should ensure that learners understand what they teach.

Researcher: Then after completing your lesson what kind of follow-up, what activities do you use to assess learners?

Teacher: I give them classworks, homeworks ...

Researcher: Even now after the lesson you gave the classwork, you agreed with them that they are going to write a test on Friday. And that test will form part of the assessment.

Teacher: Yes, I give them questions also from previous examinations and test in preparation to their examinations.

Researcher: All right, thanks you so much, sir, for your time to observe and interview you and thanks once again.

TRANSCRIPT 2

Researcher: Thank so much, sir, for allowing me this opportunity to interview you. My name is Hlanganani Maggie Maluleke, a student at UNISA. Let me start with the lesson that I have just observed now. If you can give an idea of how you prepare the lessons, do you follow the prescribed policy, when you prepare the lessons?

Teacher: The CAPS is making it a little bit easier to prepare the lesson because we have what it is called, pace-setters. Pace-setters give us an idea of how we prepare the lessons per week, per day and it made it easier so we just take the textbooks and follow the pace-setters to compile and compare explanations here and there.

Researcher: Okay, all right, and then in that case does that also allow you an opportunity to see whether your learners are following up or they grasped what you were teaching them?

Teacher: Yes and in the lesson plan there is place where in I should weigh the lesson because sometimes you find out that the learners are not catching up the concepts you understand, so the evaluation help me to understand if this particular lesson has gone well or need to be emphasised for them to understand.

Researcher: If you can help me out here, what really influence the way you teach, I really like the way you teach your learners because I could see that they are interested in the lesson and they are following up, but I was looking at when you were writing using the chalkboard, and chalk and also the textbook. The learners were just listening they were not taking notes as you were writing to see that they are listening, so I just want to know, what really influence the way you teach them?

Teacher: All right number one. I'm first and foremost I prefer them to listen, you understand I tell them there is a time to take notes except when I'm talking I make mention of things that are a bit out of what they already know they can jot it down. I encourage them to do that and tell them what to do like when is time to write notes they write notes, but I take time to explain to them communicatively you interactively so, so that the idea will sink into their minds. They would not have it in their books, but in their minds. Okay: You understand and I believe in interaction one would ... so that's why I involve them because if they are writing and I'm talking second point, some points I make they might not get them they might not be able to get everything.

Researcher: All right, and also I saw you were giving them hand-outs, notes. Is it the same notes that you were making?

Teacher: Yes, exactly you that what is in their notes are already there so there is no need for them to write down notes. Few exercises that I did on the board is from that book and is already explained in that book. Some learners are not so much smart to understand how we got to this so I had to explain on the board.

Researcher: Okay, thanks so much. So let's go to your qualification. How qualified are you?

Teacher: Yah, I have a postgraduate.

Researcher: That's honours?

Teacher: Not honours, Certificate in Education.

Researcher: Okay, how many years of teaching experience?

Teacher: Three years now in South Africa and all in all I have 8 years. I have 5 years in Nigeria while I was still in Nigeria. And in South Africa I have been teaching for 3 years.

Researcher: And you have been teaching Natural Sciences here in South Africa?

Teacher: Yah, Natural Science.

Researcher: And is that your area of specialisation?

Teacher: Yes, that's my area of specialisation in fact when I doing PGCE, that's a certificate in Postgraduate in Education, I was doing Natural Science and Maths for lower grade. Actually I did Life Science for FET, you understand, Maths for GET but when I got here the post had already been taken so I had to teach Natural Science with Life Science component also.

Researcher: But how do you find the teaching profession?

Teachers: Aggh, to me you see teaching profession is not like how people fashion it that when you are out of it you just want to make lot of money, is just that I like teaching, I like teaching what I know, but since here I have found myself teaching something that I have passion for.

Researcher: So if you were to be offered an opportunity to decide on another career would you still go for teaching?

Teacher: Well there is nothing I do that I think I don't need. For instance I'm good at music even since I started working here in Capricorn I was doing music, I want to play musical instruments. So whatever that I have been doing teaching has always been a part of it. So even if I may say now there is no opportunity for me to teach, I will find myself teaching somehow.

Researcher: Okay, let's move a bit, have you heard about Environmental education in the curriculum?

Teacher: Environmental Education in the curriculum, yes I think I have heard about it.

Researcher: Okay, ehm and how much do you understand its implementation in the curriculum? Isn't that in our previous curriculum policy the NSC EE was running across the curriculum, it was a subject on its it was ... the concepts of environmental education were flowing in all the subjects. So now that we got the CAPS, the CAPS is said to be an amended version of the NSC is not like is repealing NSC so the concepts of EE are still in Natural Sciences we have like when you teaching a Life and Living and ...

Teacher: Like a Biodiversity, the one I was teaching the other day has more to do with the environment.

Researcher: So I just want to understand, how do you find these concepts in Natural Science? Are you able to link them with Natural Sciences and flow with the subject?

Teacher: Jah, before the emergence of CAPS, NSC has talked about context and content, content meaning that you have to teach learners what is in the book, you understand you also need to include the context which means how are going to apply what you teach in class with their daily what appears tox..., what occurs on daily basis around their environment. How they can apply whatever you are doing in class so I see that ... into CAPS because you see the way in which CAPS is structured it opens the eyes of learners to their environment, they don't just conclude that this is ecology you understand. They don't just conclude that the term Ecology is ehh the study of the

surrounding and the stuff like that, no. The curriculum goes on to explain that on daily day-to-day activities this is what happens. For instance Natural Science is the study of nature and ... and they are formed, how matter is formed, how condensation takes place so, this makes learners to understand what goes on. For instance the ... the new concepts of the CAPS the learner can be made to understand that okay condensation takes place the clouds clamps in the molecules gathered in the atmosphere and something happen and the heat ... so on the standard is ... natural science is ...

Researcher: So for you do you still feel is fine maybe to have it as it in the ... having natural science and environmental education concepts embedded in the natural science or to have the environmental education as a subject on its own?

Teacher: Because environmental okay, you said we environmental education as a separate subject on its own or have it as a cross curricula component. Well I think if we have it separate, hmm I do not know was it separate before?

Researcher: No.

Teacher: It was not separate. If we have it separate two things might happen then, its either we will be repeating concepts you understand or link emphasis on concepts you understand that either ways I think if it can be properly arranged or rearranged it should be good for it to be on its own, you understand. I think it should be good for us to have environmental studies because like natural science will not be able to cater for all areas that are involved because when you ... that the components are better being together we find that there this ... that should led to it you know it emphasise that and we can put aside as a subject on its own but as it is now it workable because everything we do in natural science is linked to it. So I would say if stay together with natural science is still okay, but what should happen is that when teachers teach these they should be able to refer not only teaching what is in the book but be able to use the surrounding environment.

Researcher: Okay, be able to make use of the available resources in their environment.

Teacher: Yes.

Researcher: Okay, let's look at teacher support. How often are you, as teachers taken for teacher support for this natural science?

Teacher: That is ..., in my 3 years of experience here in South Africa I have not been even exposed to that, we have been to seminars, instead we attend seminars like for instance science week, science annual week which happen in June. We attend that but apart from individual interest and pursuit for knowledge there has never be anything that has a special training as far as that is concerned.

Researcher: I understand for Grade 9 teachers were supposed to have been trained last year in 2013 and be implementing the curriculum now, so have you so far received the training?

Teacher: Yeah, we are ...in the form of a seminar.

Researcher: How long was it?

Teacher: I think it was for 2 or 3 days.

Researcher: And then since that training, have you seen maybe the curriculum advisors visiting you maybe as a follow-up on the seminar especially now that you are implementing the curriculum policy?

Teacher: No.

Researcher: So in that case how do you find yourself responding to the policy intentions in your natural science class? How do you respond to it bearing in mind that you have been trained for that 3 days and you're not receiving any support, especially now that

you have been trained for 3 days last year and are expected to implement this year?
How do you find yourself responding to the policy intentions?

Teacher: Okay, personally, like I told you initially, that I do some personal evaluation, so the evaluations help me to know which are the assessment and helps me to find out which are my ... even though there have not been anyone coming here apart from the HOD, my HOD comes here and find out if I can do well with this new curriculum whatever we are calling is working well. But I don't know maybe if you can talk to the HOD to help then because she often comes here and check how is this curriculum working and I will say its working fine together. We have not receive any follow-up from outside here to say okay how are you guys doing, any complaints so far on that. So, personal as a teacher I had to do that by myself and I report to my HOD to tell these are challenges I'm having and it has been like that.

Researcher: Okay and the support of the school principal, do you get it?

Teacher: Yes, jah we get.

Researcher: In case you are lost in responding to the curriculum policy intentions.

Teacher: I think is not like we are not permitted but the principal has delegated HODs to take care of the problems from the junior teachers or senior teachers.

Researcher: Okay, all right so in other words you are with the support from the HOD, which of course comes from the principal, assist you in responding to the policy. And then with a ... because I understand there are two notions when it comes to the curriculum policy, the planning part and the practice which is the implementation part of it. Do you see the relationship between the two? The planning and the implementation part of it, which one maybe you mostly able to respond to better than the other? Let's say when you have to plan and have to come to the class to teach.

Teacher: Both go together, is it that they go hands in hands because like, for instance, before I could come and teach all of these I need to find out that or are the steps correct for me to teach, are the steps in other textbooks what do other textbooks have for me to teach. Though I may have managed to use on method I managed also to input my teaching style that is as a result of different knowledge that have gathered here in the absence of planning that I made before the teaching of the lesson and the implementation or teaching they go hand in hand, you plan you teach, you go back and ... you plan and teach.

Researcher: I had from other educators saying that they are bound to do planning because the curriculum wants them to do so but not to say that whatever they plan and according to the expectation of the policy is what they are going to teach. Because they say if they are to follow what the policy want them to teach they are not going to finish the work. Either the fact that it demand them a lot of time for planning and they put lot of things in their planning which they do not take to the class.

Teacher: You see I agree, but you see teachers are different and even when we have the knowledge knowing the topic, how you are going to disseminate the information is important you understand. You, having the knowledge is one thing you telling after saying this I'm going to say this after using this example I'm going to do this, that is planning and that helps your learners to learn more from you than you giving them an impression that you know a lot.

Researcher: Okay, let me ask you, when you are trying to develop an understanding of the policy, what is it that maybe influences you the most? What do you consider most? I'm trying to get to understand what influence you most when you are developing a lesson following the policy, what influence you most? Especially within your natural science learning area, maybe you consider the type of learners you have or do you consider the type of infrastructure that you have or the knowledge.

Teacher: The CAPS comes with topics to teach, it comes with resources you understand, resources that you can use and it also comes with time allocation things like that. Now when I go through that, the way it is structured helps me to find out what do I need, what are other things that I can use, but not all the resources that are listed there are available so I try to improvise on it. I check which can I use most probably the level of learners, the type of learners we have they are ..., excepting this, their unwillingness to learn make them victims to go further. For instance if you have a set of learners who are just full of themselves, they talk in class and do not give you time to teach that makes it difficult to teach, express and act on what you understand so that's where discipline comes in. Over the few weeks I have been able to maintain order in the class so that I can be able to express myself easily. Then another thing that influences the way I carry out the policy is simplicity of the policy that, last year we were using pace-setters is a lot of topics in there. Topics that are in natural science, topics that you do in geography and history and social sciences and stuff like that but now, the curriculum has been readjusted to make things that are needed in natural science easy, that is in Chemistry and Physics that's where the foundation is if this is as simply as and not complicated as this then I can go all the way I can do everything to meet the learners and make sure they get the information.

Researcher: And now that you have mentioned the type of learners as one that also influence the way you respond to the policy. How about your experiences because now I have also gathered your attitude towards the policy which is very fine you seem not to have problems with the policy itself like other educators do have and their attitudes towards policy itself is not ... that's why things that influence them when they teach will have a negative impact and then I just want to understand from you, how about your experiences, your 8 years experiences of teaching, how does that influence you?

Teacher: It is just a way of ... to come back to the curriculum because really the curriculum is just to guide a teacher. The curriculum policy is just there to guide them. Okay when you plan that is okay this is how I can plan, this is how I can deliver my message and the learners will understand, but you see individual interest also add more to what you deliver in class. In my years of teaching I've come across different learners and I now understand that. Teaching and learning has to go in the class, firstly, discipline must be instilled in the class and after discipline in the class is interest of the teacher in that subject, if you are interested in the subject you know it motivates you to go all the way to look for resources. You will look for resources, solution to problems in order for you to disseminate properly. Another thing is passion for what you do, if you do not have passion for what you are doing you will just do it because that is what you have to do. The fact that a teacher needs to derive joy in making others see what they do not see in a better way that motivates me.

Researcher: So it plays an important role on how you respond to the curriculum policy. Then tell me we talked about the concepts of environmental education within Natural Sciences. When you talk about those concepts you teach them like you are teaching Natural Science subject.

Teacher: Yes.

Researcher: You use the same strategy like you are teaching Natural Sciences.

Teacher: Yes, I use the same strategies including environmental issues just connecting and making emphasis to the environment and connecting the concepts of environmental studies.

Researcher: Let's look at these Grade 9 Natural Science learners, they are at the exit point of senior phase in the GET band and from here next they will be in the entry point of

FET band, and that is where they begin to choose subjects. With your Grade 9s now that you are teaching, are you now able to see whether they will be able to follow this field?

Teacher: Well, I think I have made mention of this previously. There are different learners and you know them by their attitudes towards a lesson, towards a classwork some of them they do not really know much but they are willing to try so that helps you to understand that this is what I can do for this learners. Presently I got 65% of the learners I am teaching who are interested in Natural Sciences and they might choose something, either Physics or Life Science in Grade 10 because of the way I see the response to it. That can only be done by a teacher and you at that love for a subject you see the passion and love for this thing maybe they will see that it's not so bad at all.

Researcher: I guess in your planning for the lesson as following the policy you should do it in such a way that you also think of the child as in now and think of their tomorrow.

Teacher: Yes, you remember when I was telling them during the lesson that these equations you are going to get them when you do Grade 10 and to the higher institution your first year in Chemistry will be having these equation. So I need to do it to make them understand not just to pass their exams, but to understand the concepts because once you they grasped that study it will help them for the rest of their lives. Grade 9 is like a fundamental stage of Science and Technology for FET, they just break the concepts of Science in Grade 9 is much difficult that is why I personally took it up by myself that I will do everything that it takes to make these learners fall in love with this science subject.

Researcher: In order words you prepare them for the future grade challenges while you are still teaching them here. That is good indeed. I guess this transition from Grade 9 which is the exit point of senior phase, it's very important because if it is not well done we might lose our learners.

Teacher: Definitely, this is where the child's future is decided because when they resume with the classes you see it a welcome to determine when you are going next year. That understanding also helps me to take it serious those learners who come to me because they do not understand, I will take time to assist them and explain to them because I know that their future depends on what I teach them.

Researcher: In Grade 9 that's where they begin to lay the foundation, are these learners' progress from Grade 8 justified? Do they progress to Grade 9 based on their competencies or the fact that they have to progress? So in other words what you are teaching is that you are that there is progression from Grade 9 to Grade 10.

Teacher: Actually most of them I teach them Grade 11 stuff, but ensuring the progression from Grade 8. I make my learners to know that you don't just pass for the sake of pass because it's of no use. If you are condoned it means you did not pass eventually they are all going to be condoned to Grade 9. There is a way you can psychology instil to remind learners. I make them to understand that being condoned is just as good as fail, but I'm making them to tell themselves that this is what they can get. The learners need to be able to tell themselves that this is what they can achieve for themselves in Grade 8 so I make them understand that either you are brilliant or not if you cannot perform above 50% in my subject then you have failed, you cannot pass condoned or not you fail. Even if they say you are all going I make them to understand so that they know that they are creating their own traditions so I tell them that okay it's being condoned if you not able to attain this particular marks in my class and the same goes to all the subjects so that make them to understand that okay the concept of passing and failing is applicable while I am here and I need to be

mindful of passing and not just that I am in Grade 8 I will be automatically be pushed to Grade 9.

Researcher: So it means that ... it also give the learners who are lazy to pull up their weight because they know that even though the policy says this is what is supposed to happen.

Teacher: You don't get 50% and above you don't get pass.

Researcher: And that way they are able to respond to ... and do their bit. No. Thanks so much, sir, for your time it was great talking to you and thank you so much for opening to me and provided information that I needed. Thanks sir.

TRANSCRIPT 3

Researcher: Thank you very much, ma'am, for allowing me this opportunity to interview you, my name is Hlanganani Maggie Maluleke a student at UNISA. I am going to interview you today following the lessons that I was observing for Grade 9 Natural Sciences. I would like to hear from you about what influence the way teach Natural Science in Grade 9.

Teacher: The influence is like number 1, the type of learners that I'm teaching that is one factor that influences how I teach like that and then their ability as well also is one of the factors that influences me to teach like that to use that approach depending on the type of learners and their ability to teach the way I do.

Researcher: You said is the type of learners, okay, and their abilities. How about your experience, your teaching experience?

Teacher: Actually I was from the rural schools before I came to Capricorn right, you know learners in rural schools are different from learners in town because in rural schools learners are not exposed to so many things like those in urban areas like Capricorn High School, they are not exposed to the internet and the current affairs, but the children here in town are exposed to so many things like when you have given them maybe a task like a research they will go all out to research and get the information from every corner.

Researcher: Let's quickly look at your qualifications ma'am, what teaching qualifications do you have?

Teacher: I have a diploma in teaching, whereby I have specialised with Afrikaans and Biology. By then it was called Biology and now it is called Life Sciences. Then I also have a degree in Education with UNISA because I specialised in Education.

Researcher: How many years of teaching experience do you have?

Teacher: I have 25 years of teaching experience.

Researcher: And for how long have you been teaching Natural Sciences?

Teacher: Since the inception of the new curriculum, by then it was General Sciences and by 2000, was it 2000, wherein we started with this new curriculum and the stuff, well let me say its 25 years since I have been teaching the Natural Sciences.

Researcher: Your field of specialisation you said is Life Science, okay. How do you find the teaching profession?

Teacher: Teaching profession as is it, by then it was fine because learners did not have the rights, see they will respect, abide to whatever, but let's compare them to today's learners since democracy you know they are like they think they have the rights such that they sometimes do not take things serious. It is no longer interesting to be in a teaching profession these days, it's very tough because you don't know to discipline a learner, when you try to call a learner to order the learner will say no that is an abuse

I will go and tell my parents or I will go and sue you. So we do not know how to discipline them; we are frustrated. Like they usually say “you spare the rod and spoil the child”. Now is very difficult actually to deal with these types of learners who have the rights to everything and they use their rights.

Researcher: Except for Natural Science subject do you teach another subject?

Teacher: No, it's only Natural Science.

Researcher: Tell me, now that you have been teaching since then while we had the OBE, Revised National Curriculum, – the old syllabus, OBE, the NCS, the RNCS and now the CAPS. So tell how much do you know about environmental education within the subject and in this case within Natural Sciences?

Teacher: The environmental education within Natural Sciences, Natural Science is a practical subject where you find that learners are learning things that are within and around their environment of course like it is divided into 4 strands we are doing Life and Living where we started with the plants and animals and they are exposed to those things, then when we coming to Matter and Materials that is where the Physical Sciences is part where they do the practicals like investigating, science activities actually.

Researcher: Because you can feel this environmental education concepts embedded within Natural Science subject. How then do you find teaching it as part of Natural Sciences in Grade 9?

Teacher: The two are very much integrated in the sense that say I'm teaching about the cell, the animal cell and the plant cell and maybe the body systems in particular where you find out that I'm teaching about the digestive system and the nervous system so those are just practical case, but you will find that some of the learners are more experienced in their body systems or in their bodies that is the everyday experience. Like now when I'm teaching digestive system maybe and I'm teaching about a balanced diet in particular that we know in a balance meal there should be carbohydrates and so much quantity of fats and proteins so they can practice that at home and then try to avoid fatty foods and all those things they can practice them. So you know that if you practice such you know the knowledge they acquire they can apply it to their everyday life.

Researcher: So with that in mind, do you see it still fine to have this environmental education taught as part of other existing subjects in the curriculum like you are teaching it as part of Natural Sciences not Environmental Education as a separate subject on its own. So which one do you think works better?

Teacher: As it is now. You know what because like some of the learners who are doing Natural Science at least they will have a background knowledge of Life Sciences and those who will be doing Physical Science also will have a background knowledge of Physical Sciences because in FET band, that is Grade 10 to 12, they will be doing environmental studies as part of the subject so I think it's fine.

Researcher: It is fine as it because it allows all the learners to have an experience of environmental learning and if it's located within this subject they will all have this understanding. Tell me, like you said the only challenge that you have is about the learners' rights that are too much and warrant them when you try to discipline them they promise to take you to court and all that. So with all that in your mind if you were to be given an opportunity to decide to make another choice of a career, will you still go for teaching?

Teacher: I will never, I don't think I will go for teaching, not at all because of this type of learners and one other thing because the changing of the curriculum always is frustrating us.

Researcher: How is the curriculum policy frustrating you?

Teacher: CAPS, okay let me start with the Revised National Curriculum Statement as NCS, you find that is a new thing and like add some other new concepts and all those things is fine. While we were busy trying to learn some of these things and try to adjust all of a sudden is changed now is another thing so we keep on learning, learning and learning new things every time which also affect your learners because as you are learning you are adjusting.

Research: At the same time you teaching learners, and as you are adjusting new things come up. So in that case now that you are having this new curriculum, I understand Grade 9 educators were supposed to have been trained last year in 2013 for implementation this year 2014, have you been trained yet?

Teacher: Ohh no, we have not been trained, not at all.

Researcher: But you are implementing it before the training because that cannot stop. So then how do you respond to the policy intentions? Isn't that the policy will expect you to do this and that and in this case you have not been trained but you are implementing the same policy because that process of implementation cannot stop you have to implement it. And how does that influence the way you teach in responding to the same policy?

Teacher: Is very hard, because I have to go through that policy and see what is expected from me like the content of the subject as it, isn't it that they are saying that teaching which part or which content you are expected to teach like that and the assessment as well how many tasks you are expected to give them for assessment and then I have to go a look into the policy first and then plan the teaching lesson. Sometimes you find that we do not have the policy document we are given the textbooks as they are, so you just start off like that without anything to inform you so we just beat around the bush like that. You find that they do not give us the work programme or work schedule, so teaching without anything to help us is so frustrating.

Researcher: So that means you try to rely on your experience and how you have been teaching and how to address these learners who you faced with.

Teacher: And also how to address certain topics maybe and all those things.

Researcher: Tell me because according to the policy you are expected to prepare the lesson, so the time for lesson preparation and the time you spend in class offering the lesson and teach them, is it justifiable are you spending enough time to compliment these activities?

Teacher: You preparing a lesson is something else is not like the same as you teach it. Like now I can prepare a lesson and say today I'm going to teach them about balancing the equation but only to find that according to my ... isn't that what we prepare should last for 5 days. Like Monday I'm teaching this and give them an activity but you find that now actually it does not work like that because now some are still behind, some do not understand all those things so you have to teach the same topic and so on and so on. Actually what I'm trying to say is that what we have prepared in the written form will not correspond with what you are teaching.

Researcher: In other words the preparation, though the preparation inform what you are going to teach it does not mean that it is going to be delivered in the class as it is. So the part of preparation is done because is what the policy expects you to do so but when you teach you do not follow every step as it in that planning. So in that case let's look now at the support that you get as educators, as you have not been trained but you are implementing this policy, so in case you are stuck where do you go for support?

Teacher: Me in particular when I'm stuck I phone the curriculum advisor concern to help me or clarify to me on certain issues. But now not all of us have the access to curriculum advisors so it's a problem.

Researcher: Do the curriculum advisors always avail themselves when you call them?

Teacher: No not always. They don't come they just communicate telephonically and that's it.

Researcher: And then from the principal, how much support do you get in terms of the policy implementation issues?

Teacher: When it comes to policy issues?

Researcher: Curriculum policy issues like in case where like a curriculum advisor can assist like you said you talk over the phone and you still feel you need some more assistance do you get it from the principal or ...?

Teacher: Sometimes I go to my HOD who will assist where she can.

Researcher: Lets then look at the ... in trying to understand the policy like now that you were not trained and you have to run with this policy.

Teacher: The only thing they did was that we were called to attend the workshop once whereby they were just giving a summary of everything and then they handed out the policy documents and that was it.

Researcher: And from there you expected to come back and implement it. But if you were to advise which way do you think will be the best when it comes to this policy? Which way do you think will be the best for educators to be in the same understanding of what this policy expect you to do, what do you think will be the best way? Because at the moment you are invited for a 3 day workshop and from there you are expected to do justice in implementing it. What would be the best way for you as educators to be involved in this process?

Teacher: The best way I think is to call the workshop as it is and from there maybe if we can have the experts maybe the academics where by the have a thorough knowledge of the policy as it is and then to conduct a workshop maybe for a month or so and from there like maybe say the teachers also should be given chance to make inputs on the policy and I think in that way it could help whereby teachers are given the chance to make inputs in the policy unlike just be given the policy and be instructed to implement it without proper training and chance to input on it because some of the things are wrong and then we don't have anything to do, but we just implement them as they are, but then if we were given the chance to make our input maybe would like have given our ideas and opinions and recommendations towards the policy since it is us who are implementing. Because we like facing with many challenges and problems regarding the implementation of the policy, but when we go to curriculum advisors they say we just here to implement we are not the ones who formulated the policy and all those things so as teachers we can have platform to raise our concerns on the issues regarding the document and then give the recommendations, I think in that way it could help.

Researcher: So tell me as it is now, as the policy is now. Do you see it as complementing the reality of what is happening in schools?

Teacher: Not really.

Researcher: And that is where the frustration comes in?

Teacher: Yes, you see that now especially in rural areas you know this new policy like the tasks the practicals, they are all practicals that we are expected to give the learners, you find the they want you to test for starch and you use the methane and the iodine solution, but as school rural school, they do not know what a beaker is to start with, they do not have anything, no apparatus, no lab no chemicals nothing. So it is frustrating especially for the teachers as well as for the learners. And then task

number 2 also learners are also expected to do to test for acidity or alkalinity of certain chemicals, no laboratory, nothing, you see now that's a problem.

Researcher: That's a serious problem and that some of the schools that I have interviewed their educators in rural areas that's the challenge that they have to say that the policy expects them to do 1,2,3 but at the same time the environment in which they find themselves in is not conducive, the environment does not allow them to implement it as the policy want or expect them because they do not have infrastructure. You are very right in 1 school they do not even have a thermometer the teacher said for her to get a thermometer to run an experiment she had to go to a clinic and ask for that thermometer, actually she had to borrow it and take it back after using to the clinic. And for the other experiment she will have to go the other school, but that school now does not have anything at the moment so they cannot even share. That's why she said it is a challenge. In case I just want to understand with those challenges that you have mentioned, how do you try to honour the intentions of the policy, isn't that the policy expect you to do that but you don't have enough, so in your class when you are teaching Natural Sciences, how do you ensure that you try to honour the intentions of the curriculum policy or do you just do what you can to make that learners understand the concepts?

Teacher: In my case well, the school is well equipped so I don't have a problem with that, everything is there in place, I don't have a problem. But now regarding the rural schools there are problems I know I'm from there, we used to give them explanation as it is and that's it. But yet the policy will be said to be an inclusive policy includes all types of schools, but in reality is not.

Researcher: But this goes with the type of learners that you have. Do you find it possible to honour the policy intentions with these difficult type of learners you have?

Teacher: It is even though I'm struggling like in the case when we are doing practical they are many and will have to group them in 5s then we go to the lab and is very difficult to because they are many, you will find that they are forty something in groups and find that we have to run around with this group you go there and you go there with such things, but anyway we are trying.

Researcher: So tell me with the Grade 9s isn't that they are at the exit point of senior phase in the GET band and then next year they will be in Grade 10 in the entrance point of FET. So how do you ensure progression while you are teaching your Natural Science since that is also an expectation of a policy that should ensure progression and now that from Grade 9 to 10 is the different bands and there is gap, a sort of a transition in between? So how do you ensure progression with these Grade 9s because I understand when they come from Grade 8 because of the same policy some of them were condoned.

Teacher: Actually all of them, the policy say that all Grade 8s must be condoned to Grade 9, but that depend on the parent if you don't want your child to be moved to Grade 9 you can, but the policy says all of them must be condoned to Grade 9. I have a list here, 45 of them failed but were all condoned to Grade 9 and some of them cannot even write their names, just to write the names they cannot. We are faced with a very serious problem.

Researcher: That's what the policy wants and expects you to do, that all of them should progress to Grade 9.

Teacher: They must progress to Grade 9 and that they must expect miracles that learners pass.

Researcher: So in that case how do you actually ensure that progression for these learners in Grade 9 who will be progressing to Grade 10 next year? And to me Grade 9 is very

critical, because by the time the child pass Grade 9 this child must ready because that is the person who now is going to decide the future. In Grade 9 they are at the point of deciding the future as to what I want to be.

Teacher: Yes, because now they select subjects and this indicates what you want to be.

Researcher: In Grade 9 I start to indicate who I am. So how do you ensure that: Because I think now in your Grade 9 Natural Science class you have got the burden of now beginning to know that this one can follow this field, but this cannot follow this field? You have to ensure that as doing Natural Sciences they must understand it in such a way that if they decide to follow it they are fine. So how do you deal with that?

Teacher: It is very difficult I am telling you. You find that some are just helpless and hopeless, they are confused they do not know what is going on in the Grade 8. We tried to do extra lessons, giving them extra classes, more attention giving them tests just like implementing the turn-around strategy to help them but it is very difficult, I am telling you.

Researcher: From a look of things, do you think it's fine for these Grade 9 to be at the point of deciding or do you feel think they are still young, still full of playing, they are not yet sure and they are not yet ready?

Teacher: Not at all they are not yet ready, only 1 out of 10 maybe, but the rest are not yet. They are actually lost, they do not know what they are doing they think coming to school is to be with friends and have fun. It is very difficult.

Researcher: And thus what the policy expect them to do to be able to decide their future. I still share the same sentiments though that Grade 9 learners decide his or her future is still a little bit earlier for that. But well because that's what the policy wants that by this time this learner will be in a position to decide is the same when they say they choose in Grade 10, it's all the same, it start in grade 9.

Teacher: Exactly, it start in Grade 9

Researcher: Because they choose in January of their Grade 10 and that will be even less than a month since in Grade 10 so the whole work would have been done in Grade 9 where they begin to know that now I understand Natural Science and I can follow this field and that happen in Grade 9, not in grade 10. No. Thanks so much for your time, it was great talking to you and allowing me this opportunity to interview you. Thanks again.

TRANSCRIPT 4

Researcher: Good morning ma'am, my name is Hlanganani Maggie Maluleke from the University of South Africa. I am a student doing a research on curriculum policy implementation of environmental education within natural science in our South African context or South African policies at schools. And thank you so much for your time and I will need to interview you. I understand you are just a Grade 9 teacher of Natural Sciences. I am not going to waste more time. Let's quickly start with your qualifications. And feel free to tell if you are not comfortable with some of the questions or you want me to revise or speak to you in ... Yeah, what teaching qualifications do you have at the moment?

Teacher: Okay. I started with my Senior Teacher's Diploma (STD) as PGDE, level 3.

Researcher: Up to level 3.

Teacher: Yes, and specialising in Mathematics.

Researcher: How many years of teaching experience do you have? For how long have you been teaching?

Teacher: 21 years, and thereafter I tried to further up my studies with the university, with Rhodes where I was doing ...

Researcher: Okay, you were telling me that you furthered your studies ...

Teacher: I furthered up my studies with Rhodes University whereby I was doing ACE degree specialising in Mathematics then from there I went to UNISA and I did my ABET in Education followed by ACE. And now I am busy with my honours degree with the University of Limpopo. Just left with one module for reporting.

Researcher: For how long have you been teaching Natural Science?

Teacher: Natural Science, I have been teaching at Litsheketsheke High School for only 2 years and thereafter I used to teach it at Mamabolo where I have worked for about 1 year and I came to this school to teach the same Natural Science and it has been a year now since I have been teaching natural Science in this school.

Researcher: So in total you have taught this subject for 4 years for Natural Science and how many years of teaching in total?

Teacher: Yes, 21 years in total.

Researcher: How do you then find the teaching profession? You have been teaching for 21 and how do you find it?

Teacher: Yes, teaching profession, it used to be something very interesting, something challenging and something that made you know more most of the things. But nowadays, it start to be ... I don't know what to put it ... it seems heavy to me because maybe I'm getting older, but when I started going to Limpopo University where I started with my Honours degree I realised that this teaching is not bad is just that it needs us to continue furthering our studies and stop studying and say I'm ... because the more you read is the more you feel interested in searching other things. Because if we do not study, we do not learn and we will not be creative.

Researcher: So tell if you were to be offered another opportunity now to decide, which profession will you go for? Will you go for teaching or will you choose something else?

Teacher: I sometimes so wish I can find channels to technical institutions. I don't know but I like the technical things maybe those people who are in technical institutions I like how they work.

Researcher: So it means you are interested in hands-on a lot more than theory?

Teacher: Yes, but still in teaching, but in a more hands-on teaching environment.

Researcher: And the reason for this is that a, once in this Honours degree I did the so called Technology that subject seemed to be difficult to me but the time I was getting deeper into that subject I feel I started to be interested in that and I liked it and then the lecturer which we were having that time used to say, Technology is so simple when you are applying the contextual right. You see there is something that you can teach it using some context and I started to ask myself how am I going to get the contextual things and I realised I was researching about this things of the gears so that man-made mention of the tools that are used in the kitchen and I realised that the context work and I started that way with kids. The learners were able to mention different tools in the kitchen that can be used for other things than known for and realised that we make use of these thing differently.

Researcher: Difficult while is easy and are around our corner. So tell me except for Natural Science, what other subjects are you teaching here?

Teacher: Mathematics.

Researcher: You teach Maths because that is your field of specialisation?

Teacher: Yes, I like that I have Mathematics. I want learners to love Mathematics and to see and realised that we are learning Mathematical life?

Researcher: Let's now go to your understanding of environmental education in the curriculum. How much do you know about the teaching of environmental education within the existing curriculum?

Teacher: I don't know much, but I make sure that with the little knowledge about the environment I teach these learners. I still feel that environmental education exist everywhere and there is interaction between environment and many things. Like organisms they depend on the environment and we depend on the environment.

Researcher: In your understanding do you see or feel the relationship between the environment and science? Do you see a relationship between environmental education and natural science?

Teacher: Yes, especially that in the natural science, there are some concepts that are more about environmental education.

Researcher: So are there topics within natural science that are more about environmental education where you feel the interaction between the two?

Teacher: Yes, especially the section that I was teaching in the first term. Life and Living, I realised that there is more environmental learning in to it and also to science especially when we talk about consumers, producers and how they depend on the environment because if the environment is well cared for the production will be high. So this shows that as we depend on the environment we must also take a good care of it.

Researcher: So in other words you feel the relationship between environmental education and natural science as a subject and that make sense when you teach it with an understanding. What type of teaching materials do you have in your classroom that you use when teaching?

Teacher: In my classroom, I make use of textbooks without learner guides for Grade 9 and also charts which came with teacher guide. Pictures of Plants and Animals concepts in the wall such are very helpful because I am able to show learners while teaching and they see and understand better as they see how these systems connect with each other.

Researcher: So in your teaching of natural science, are you able to involve environmental learning within your teaching?

Teacher: Yes, but the difficult part is when you try examples and allow learners to make use of their surroundings to learn how their activities in the class are connected to the environment. They do not bother for them learning is about things in the textbooks and not environment.

Researcher: So they do not appreciate making use of the available resources that we have in our environment. In that case do you feel it is wise to have environmental education as it is or separated from natural science?

Teacher: I think if we have it as a separate subject it is going to be tough. We are struggling with textbooks now for the subject that have been in the curriculum for long. So if we can have this it's going to be very difficult also in getting qualified teachers in that field. What we could do maybe is ensure that we cover concepts in environmental education in all the subjects in the curriculum.

Researcher: What are the challenges that you experience when teaching environmental education concepts within natural science? Are you able to teach them as per the policy expectations?

Teacher: Language is another thing, for these learners some of the concepts we need to explain in the mother language for them to understand, otherwise you teach and will see it after the test that they did not grasp anything.

Researcher: Right, have you ever receive training on how to teach these environmental education concepts within natural science? Have you been to the training on how to teach environmental education within any subject?

Teacher: No, I have never been to training for such but I went to one workshop whereby they were briefing us about the syllabus. I was frustrated because the examples they were using were not helping me in the real sense of it. I think it would have been better should they have allowed us to share the challenges we have and they help us on things that we are doing or experiencing in schools. I still feel that if maybe the curriculum advisors can group us accordingly and arrange a workshop that will deal with challenges we raised with when they do their support visits. But because they do not come they do not know the problems we experience hence the workshops are way from our expectations. So they cannot even do follow-ups because they know that how to help us.

Researcher: So what kind of teacher-support strategies would you recommend for the workshop to be helpful to you as a teacher?

Teacher: I would rather prefer to have these workshops on a monthly basis so we do not stay long without not being sure of whether what we do is right or wrong. Curriculum advisors need to organise us and put us in groups of our areas and workshop us. They can even call a meeting with us and allow us to share our challenges with them and in the next meeting with them they should assist us on how to deal with the challenges. But as it is now I sometimes feel they do not exist because I have never seen any of them but I heard there're curriculum advisors.

Researcher: So are you saying these CAs are there but you have never been supported by them?

Teacher: At the circuit level well they do support because sometimes they would want to see our files through issuing a circular and tell us that they expect our files at the circuit office by this date. And there is no way one cannot submit the files, we all are forced to submit these files to our specific circuit offices.

Researcher: What is your view of the curriculum change from the NCS to the CAPS curriculum policy with regard to the Grade 9? The Grade 9 teachers were supposed to have been trained in 2013 so they can start implementing CAPS now in 2014? Looking at the transition from the NCS and CAPS policy how is your view?

Teacher: I have not been trained in the teaching according to CAPS policy but I am expected to teach following the CAPS policy. Last year I was not teaching Grade 9 Natural Science. I only started teaching Grade 9 Natural Science this year in 2014. So I do not know whether what I'm teaching is right or not.

Researcher: Then, how is your understanding of the amended curriculum to CAPS? Does it offer more opportunities to interact with learners as you were?

Teacher: The curriculum policy provides more work for teachers to do than for learners to learn. In the new curriculum policy CAPS, teachers are expected to do a lot of work while learners have this much, but they are the ones to write examinations. And because we concentrate on doing those things that the policy want us to do, it leaves us with less time for teaching and end up telling learners and not teaching them.

Researcher: And now that you said you have not been trained on the implementation of CAPS. How are your experiences of the policy intentions, are you able to teach according to the expectations of the policy?

Teacher: We were given policy statement during the 1-day workshop and that is the only tool I have for my teaching preparation, I check it to make sure I am in line with the expectations of the curriculum policy. The pace-setters show when different topics can be taught and for how long and how they should be weighed.

Researcher: So are you able to follow what is in the curriculum policy?

Teacher: I am just trying and not sure if I am doing it right, we are two teachers in this school teaching Natural Science in Grade 9, when I ask him for help he always say he will come and help but he does not, so I work alone and he does his work alone.

Researcher: In order words there is no teamwork, you are on your own. So what do you see being a challenge when you teach like that, following the curriculum policy?

Teacher: Time for me remains a challenge, I spent more time preparing for a lesson than the time I spent teaching in the classroom. Again not all that I put on my lesson plan go to the class. I put some of the things as we are expected to but some are not applicable in the classroom. For example if I had to conduct an experiment, I will be expected to list all the apparatus that will be used and chemicals. I will do so and show it on my lesson plan but this school does not have even a thermometer and if I need to use it I will go to the clinic and borrow. Some experiments we do in our neighbouring school if we cannot borrow but now they do not have enough also so it is a challenge because the policy says we do things this way, but we are not supported enough to do as such. We do not have resources in this school like other schools do.

Researcher: The availability of resources is a challenge here in this school. This also influence how you implement the existing curriculum policy?

Teacher: Yes of course, how can I write if I do not have a chalk. We cannot always improvise, we are here to teach and make our learners learn and understand. The department should ensure that when we come to work we are given necessary tools to do our work and the policy should tell us how to use those tools. We do have a mobile laboratory here at school but I do not even know what is in there it is always locked. Only few have access to the mobile laboratory which frustrate me a lot because some learners are not benefiting from it and other do but they are all going to write same exam in the same grade and same school. I have discussed this with the HOD but it all fell on deaf ears, nothing is being done about the access to the mobile lab.

Researcher: With all these challenges, have you sought support from the principal? Or is the principal aware of the fact that not all of you are using the lab?

Teacher: I tried and referred to teacher x who always said tomorrow I will open for you and never did that.

Researcher: How does that influence the way you teach environmental education concepts within natural science?

Teacher: Actually very bad, because instead of focusing on getting learners to learn and understand prepare them for the exam, I'm affected by the school's bureaucracy and the expectations of the policy which makes it difficult for me to get support from others. Instead it is like we are in a competition here, but affecting the performance of learners.

Researcher: What do you consider influential in understanding the policy as you should, what do you think could be influencing the way you understand the policy?

Teacher: The way it is and the fact that it just has been brought to school for us to implement, we were never told of the new policy. Every time they change or make new policies they do not involve us. I think if policy makers can invite us to be part of the planning, design and implementation will be just smooth. We will be able to advise on things that are possible and those that need resources to be in place before implementation. That way all the schools will have same resources and same chances to learn same things though in different set-ups. The issue of changing curriculum policy every time there is a new minister is really taking us nowhere. We need to stay

with these policies for longer, learn and improve them where necessary. We keep on copying from other countries and none of the countries are copying from us because we are always changing from one policy to the next.

Researcher: You indicated that you were not trained on the curriculum implementation and teacher-support has been very poor. So how often do you teachers meet in this school and share different issues?

Teacher: Amazingly, we meet very often and most of the things for natural science even the principal will never ask from the HOD but will come to me and I try and provide such to her and the other staff members, but I do not get the support from them. I don't know, maybe they think I am joking when I asked for help from them.

Researcher: So the principal have faith in getting what is needed maybe even by the department than from the responsible teachers which of course is not your responsibility. Anyway thank so much for your time and allowing me to interview, thanks again.

TRANSCRIPT 5

Researcher: Thank you so much sir for your time to interview after observing your lessons. Now let's start with your teacher qualification. What teacher qualifications to do have and how many years of teaching do you have?

Teacher: I have got a diploma and ACE management, diploma in Education and now is about 20 years since I have been teaching and 14 years in this school.

Researcher: How long have you been teaching Natural Science?

Teacher: It could be my sixth year now, ever since I started teaching Natural Science, you see we have breaks in this school. If this first 6 months is me the next 6 months could be someone else.

Researcher: What is your field of specialisation?

Teacher: Maths and Science.

Researcher: How do you find the teaching profession, if you are to make a choice now would you still go for it? Do you see it challenging or interesting?

Teacher: Hmm right now, teaching is very challenging, learners are not doing their work, they are not disciplined and overcrowding contribute also because we are not able to give them individual attention as required by the policy. They are too many in a class that even marking their school works takes long to finish. As for making a choice, I don't think I will continue with teaching. Teaching has changed, we have a lot of paper work to do which takes our time and leaves little time for physical teaching.

Researcher: Still on that one, how does the policy influence that?

Teacher: The policy is changing, but I can say we cannot manage the way they are it is difficult to meet the standard of the policy at the same time just because we have been using the old method of teaching, we used to outline the old method of teaching just because group work does not work in our school, some learners do not do their part in group activities.

Researcher: How about the issue of individual attention, isn't that the policy requires teachers to give learner individual attention? So how do you provide that?

Teacher: We cannot manage; the time will not allow that.

Researcher: Except for Natural Science you said you also teach Maths Literacy. You teach Maths Literacy, which grade do you teach?

Teacher: This year I teach also Grade 11 and 12 Physical Science.

Researcher: You teach Physical Science Grade 12? And also Grade 9 Natural Science. Have you heard about environmental education curriculum and if so how much do you know about environmental education?

Teacher: Yes I teach Grade 11 and 12 Physical Science and I also teach Grade 9 Natural Science. I have heard about environmental education and regarding its implementation in our community it cannot be really because our learners do not understand things.

Researcher: And within your subject Natural Science in Grade 9, how do you find implementing environmental education in your subject?

Teacher: We are trying, but our learners most of them are dependent on teachers and are not able to do research work by themselves, of course, because of lack of resources we end up doing research work for them. If one learner managed to do it they will all copy from that learner. You will find that out of 53 learners only 3 or 5 learners would have done the work, and the rest they copy from others. The same goes with test, when you give them test they will copy from each other and will even write the wrong answers.

Researcher: So how do you teach environmental education within the Natural Science?

Teacher: Ehh we just relate to what we have in our surrounding, for example smelters. What must we do, especially planting of trees, when it comes to whatever events we need Natural Science.

Researcher: So in the process do you see the relationship between environmental education and Natural Science?

Teacher: I think they are too much related, and there is a mutual relationship between the two. The only challenge we have is that with our learners from Grade R to Grade 8 they just progress and at time are found to be not able to write their names and in Grade 9 that's where we start to worry about them.

Researcher: And in Grade 9 they are at the exit level of GET of senior phase they are proceeding to entrance level of FET and in Grade 10 that's where they begin to choose subjects. So it means there's possibility that the learner might choose subjects that they do not understand.

Teacher: Yes, there is that possibility, and these learners tend to follow friends' choice not because they like or want to become whom they should, so they just choose without understanding what's best for them.

Researcher: So what types of teaching strategies do you use and also the materials that you use?

Teacher: We use question and answer methods and also telling methods in most cases, these are the ones applicable to our situation. And we give them notes to write down.

Researcher: I observed that during the classroom observation that day when I was observing your lessons that you are able to involve your learners through chalk and board method.

Teacher: Yhhh, if you just give them work to do in groups, group work it will take a very long time to finish and they will also make noise and when you say is time to present you get nothing.

Researcher: So in the process do you see the need to teach environmental education as across curricula component, isn't that you have environmental concepts within Natural Science and teaching it as a cross curricula component and not as a subject on its own, but just that it has been infused within that subject. So do you still see the need for environmental education to be taught as such?

Teacher: Jah, I think it will have to be like that because it is a reality life has changed and is still changing day by day and we cannot run away from that.

- Researcher: So tell me if you are to be given an opportunity to decide how environmental education should be taught, how would you like it to be taught? Will you still want it to be taught as a cross curricula subject, and why so?
- Teacher: As component within the existing subject so it does not create more load or overcrowding of subjects in the curriculum. You see we do not have enough teachers at the moment so more subjects might mean that we will have teachers teaching more subjects that they otherwise should. With our curriculum policy demands it will be more problematic than it is now.
- Researcher: So you will prefer it as a cross curricula subject meaning that in Mathematics, Physical Science, and Economic Management, etc. learners will have an opportunity to learn about environmental education. What do you find more interesting in teaching environmental concepts within Natural Science in Grade 9?
- Teacher: For me I think it poses challenges that we must address, it is challenging to see how our actions affect the environment and also how we soon we should act on it. So it is an eye opener on how we should be careful with our actions on the environment. It is also interesting to see how much learners are interested in the different concepts because they are able to relate to their day-to-day experiences.
- Researcher: And now that you say it is more interesting as a cross curricula subject, are there any implication or signs to show that these learners are benefiting from environmental concepts or learning. Are they able to appreciate the relationship between the environment and science?
- Teacher: Yes of course it is only that we are disadvantaged by the lack of resources in our school; we do not have all that we should in order to teach and meet the demands of the policy. And we do not get the support we need from curriculum advisors because we are not able to get hold of them.
- Researcher: So in that case, who do you consult, your HOD or the principal to invite the curriculum advisor to the school?
- Teacher: It does not matter how much we try to get them to our school, we just do not see them in our school. I have not seen a curriculum advisor for Science, I was told we will meet with them during the training for CAPS, but we were not trained so I am still wondering if there is one.
- Researcher: Ohh is it? So if you need some support you have to wait for them until when they are available?
- Teacher: You see even when they have to assess our work, they will send a circular that they need our CAPS and we will prepare our file for that purpose, not because we do what is in those files no, but for formality we put them together and they will check and look for whatever they want to see and confirm in our files and send them back. So whether you are doing it right or not is not their concern because they will not come to class and observe us like you are doing to see if we are struggling or not.
- Researcher: And now that you mentioned this CAPS, what is your view of this curriculum policy, NSC amended to CAPS?
- Teacher: I think when they talk practically, theoretically it is good, but practically it is too difficult to implement it. You see when you are seated you can say just give these kids this and that at the same time you find that it is too much impossible or that you cannot do it at once.
- Researcher: So it means that you find it practical impossible to implement the curriculum policy.
- Teacher: Yes when they talk about it, you may think that it makes our work lighter, but the reality is that we have more paper work than before.

Researcher: On papers it is beautiful but when you have to implement it is then when is ... [the teacher went out]. Okay what makes it very difficult for you as an educator to implement it, is it because of the situation?

Teacher: The training itself.

Researcher: What is wrong with the training?

Teacher: I have stated that there is not enough time for training, you cannot train someone for 2 days and say go and do this as it is for as long as the policy still prevails. And I think CAPS itself needs much more time for training, and resources, no overcrowding and reasonable number of learners per classroom. You see even in Grade 9 I don't think they are aware because you find that they are having 6 periods a week on that 6 periods it does not mean you go to class every day. You find that you have 2 double periods and if there can be a meeting or something you have lost your time to cover the work scheduled for that time.

Researcher: So now that you have mentioned the challenges within the curriculum, how do you as an educator interpret what the policy want you to do, the policy intentions how do you interpret them and put them into practice? How does putting the same curriculum into practice mean, because the curriculum policy want you to do this while the school has this much to accommodate the curriculum policy implementation. How do you then respond to that and implement?

Teacher: It means that if you are alone in a certain subject you cannot apply it, that is why in most cases many teachers leave the career because it has a lot of work that needs to be done, a lot of paper work.

Researcher: What do you think could be the possible solution maybe to these frustrations of policy intentions? Are you able to put into practice what the policy want you to?

Teacher: I think the department itself need to be independent, not dependent because right now if you can look they are changing curriculum time and again because the department is changing leaderships. When there is a new leadership the curriculum changes following the wishes of the new person.

Researcher: So in that case when everybody comes in changes the curriculum and keeps on changing. What advice can you give as a teacher to other teachers with a similar understanding of curriculum change and its implications?

Teacher: I think those who are responsible with curriculum change should be people who are part of teaching and learning so they have a better understanding of the realities within the schools. But these people are in the offices or parliament who always wants to copy curriculums from other countries e.g. USA, Australia or UK and they bring it here without addressing basic issues of technology usage in schools or infrastructure to accommodate the copied curriculum.

Teacher: But they apply it as is to look like the one in those countries and that is a challenge because your school is not like the schools in USA where the curriculum is copied and working properly. Your school does not have the same infrastructure as the schools in USA, for an example.

Teacher: Even if you can just check learners in well-developed countries, they are used to go and look for information from the specialist for teacher for example if your learners are doing like this during their space time they take those learners to certain specialist to go and help that learner with whatever career want to take. But in our case I do not know we are just scratching and searching where can you find this we are not sure whether what we have is enough.

Researcher: So okay, so if you are to advise people who draft the policies who vote for the policy what can you say?

- Teacher: Amendments, maybe there but let it be stable for certain years or time not a short space of time so that when they think it can be 10, let it be 10, and they will change after that and not to scratch everything and start something new.
- Researcher: Because then also that ... It was ... the way you teach isn't that ...
- Teacher: It cannot just change totally, and this supposed to say you are no longer supposed to move like this you must move like this, it will be difficult it will take you time and we started to be frustrated.
- Researcher: By the time you've adjusted and now you are ...
- Teacher: ... and they change it also bring in some frustration because we will adjust to this one and the next day another policy comes in before we even start to implement it properly. The curriculum policy change in our country depends on people's interests, if I become a Minister for Education of course I will want things to be the way I want and change the policies.
- Researcher: And I believe with Grade 9s because you said they are at the exit point of GET and senior phase, they will be in the following year be in the entry point of FET band thus when they are in Grade 10 they will choose specific subjects that they want. I guess with what you have given me, the challenges that you have mentioned it's also a challenge because you also have a pressure that if you are teaching this subject by this time learners would have an understanding of what they want to become in future so they will choose subjects wisely. Now that you said you have not been trained in CAPS implementation, do you see the implications of that lack of training in the curriculum policy implementation?
- Teacher: Yes, I can feel that lack and it's really frustrating now that we cannot even get curriculum advisors to help us. We do not have anybody to physically show us how to teach learners according to the curriculum so that alone make us to feel neglected and find means to teach these learners.
- Researcher: Okay let us now look at your classroom preparation, when you go to classroom to teach do you prepare your lesson? Do you follow the curriculum and meet the curriculum policy intentions?
- Teacher: Yes, especially with Biology. I prepare it but only making sure that I have prepared it according to the pace-setter showing when I am going to teach which topic for how long, its only work schedules. But not everything in the lesson plan goes to class, in the classroom I do not even look at the lesson plan, but I can teach my class to understand the concept in my own way of teaching. Lesson preparations I do it for formality because the circuit office normally requests such for their assessments.
- Researcher: So in other words you are doing that because that is what the policy expects you to. Looking at the time you need for lesson planning and the actual time of teaching, do you see any relationship between the two?
- Teacher: Yah, that's why I am saying lesson planning is time consuming because right now I am free I was supposed to mark learners' books but no, I have to prepare for the next lesson which I do not even follow in class, but I have to prepare because the policy say so.
- Researcher: And then when you have prepared that lessons let's say there is an experiment in that lesson, you have to do this experiment but because of the situation in here you find yourself in school. Do you find it practical to do that practical in your classroom while you have it in your preparation and will have indicated that ... because that is what the policy expects, but then when you go and do it practically because you do not have these resources and materials?
- Teacher: No, we do not have resources in our school, that is why even teaching we just teach the same way as we used to back in the 90s because we had been well trained to

follow the then curriculum policy. We will also allow learners time to do classwork activities during the lesson, but now with the time allocated we only teach and give them homework or assignment and tests and we make time to mark their books.

Researcher: Okay, so given the time per period as you already mentioned, what do you do when you realised that your learners did not understand the concepts or everything they wrote about during the test?

Teacher: It is difficult because even our learners still feel that in Grade 9 “pass one pass all” still applies, and it is not the case, but at the same time the policy does not expect a learner to repeat one phase more than twice. So if a learner failed Grade 8 he or she can only fail Grade 9 once and proceed to the next grade, whether competent or not. So we have a challenge because most of them in Grade 9 struggle to write words properly so you can see that these benefited from “pass one pass all”.

Researcher: So it means Grade 9 teachers are also having a challenge of preparing these learners for future subject choices in Grade 10 that will inform who they become in future?

Teacher: Exactly, we have to prepare them for the future while we are not sure of whether how we are teaching them is justifiable, but because this is the only way we can teach them we do so until such time when the department through its officials can provide us with the necessary support. At the moment we can only do what the president of the country want us to do, which is to be in class, teaching and on time, but as for the curriculum policy implementation, we are stuck.

Researcher: Okay, teacher, thank you very much for your time, it was great talking to you and thank you for telling all out as it is, it is going to be helping in the contribution of this study, thank you again.

7.2 APPENDIX 2: APPLICATION FOR DATA COLLECTION IN SCHOOLS IN THE CAPRICORN DISTRICT OF THE LIMPOPO DEPARTMENT OF EDUCATION

P.O. Box 1353
THOHOYANDOU
0950
03 JULY 2013
CELL. 082 844 4596

HEAD OF THE DEPARTMENT
DEPARTMENT OF EDUCATION
PRIVATE BAG X9489
POLOKWANE
LIMPOPO
0700

SIR

APPLICATION FOR A PERMISSION TO CONDUCT A RESEARCH STUDY AT THE SECONDARY SCHOOLS IN CAPRICORN DISTRICT

I am applying for a permission to conduct an academic research study at the secondary schools in Capricorn District. I am a registered student at UNISA (University of South Africa) doing PhD in Education and the topic of my research is, "Curriculum Policy Implementation in the South African Context: With reference to Environmental Education within Natural Sciences".

I hope my application will be positively considered


Yours faithfully

Maluleke H.M

Student No: 47719478



7.3 APPENDIX 3: APPROVAL LETTER FROM LIMPOPO DEPARTMENT OF EDUCATION

	LIMPOPO PROVINCIAL GOVERNMENT REPUBLIC OF SOUTH AFRICA
DEPARTMENT OF EDUCATION	
<i>Enquiries: Dr. Makola MC, Tel No: 015 290 9448. E-mail: MakolaMC@edu.limpopo.gov.za.</i>	
<p>P O BOX 1353 THOHOYANDOU 0950 Maluleke H.M</p>	
<p>RE: Request for permission to Conduct Research</p>	
<p>1. The above bears reference.</p> <p>2. The Department wishes to inform you that your request to conduct a research has been approved- <u>TITLE: CURRICULUM POLICY IMPLEMENTATION IN THE SOUTH AFRICAN CONTEXT:WITH REFERENCE TO ENVIRONMENTAL EDUCATION WITHIN NATURAL SCIENCE.</u></p> <p>3. <u>The following conditions should be considered</u></p> <div style="margin-left: 40px;"><p>3.1 The research should not have any financial implications for Limpopo Department of Education.</p><p>3.2 Arrangements should be made with both the Circuit Offices and the schools concerned.</p><p>3.3 The conduct of research should not anyhow disrupt the academic programs at the schools.</p><p>3.4 The research should not be conducted during the time of Examinations especially the forth term.</p><p>3.5 During the study, the research ethics should be practiced, in particular the principle of voluntary participation (the people involved should be respected).</p><p>3.6 Upon completion of research study, the researcher shall share the final product of the research with the Department.</p></div>	
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Cnr. 113 Biccard & 24 Excelsior Street, POLOKWANE, 0700, Private Bag X9489, POLOKWANE, 0700 Tel: 015 290 7600, Fax: 015 297 6920/4220/4494	
<i>The heartland of southern Africa - development is about people!</i>	

4. Furthermore, you are expected to produce this letter at Schools/ Offices where you intend conducting your research as an evidence that you are permitted to conduct the research.
5. The department appreciates the contribution that you wish to make and wishes you success in your investigation.

Best wishes.



Thamaga MJ

Head of Department



Date

7.4 APPENDIX 4: INFORMED CONSENT LETTER

TITLE: Curriculum policy implementation in the South African context with reference to Environmental Education within Natural Sciences.

Participant

You are thereby informed that your school has been sampled for data collection for the purpose of this academic study and you are requested to be voluntarily part of the participants in the process of data collection. Data collection process involves interviews for 30 – 45 minutes and lessons observations during class lessons.

The study seeks to explore how and why grade 9 Natural Science teachers, in South Africa, make sense of the policy and respond to the policy regarding the teaching of environmental education in the classroom which is regarded as a tool towards a well-informed global response to global environmental challenges. The study aims to develop an understanding of what encourages and discourages teachers from responding to the policy as intended.

The information supplied by you will be regarded as confidential and will be used for research purpose only. You are assured that your name or the name of your school will not be quoted anywhere so feel free to give your response to all questions.

I agree to be part of the study.

Name.....

Signature.....

Name of School.....

Date.....

Thank you for your cooperation.

Maluleke H Maggie

UNISA Student

082 844 4596